MOTOR AGE

Volume XXXVII
Number 7

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CHICAGO, FEBRUARY 12, 1920

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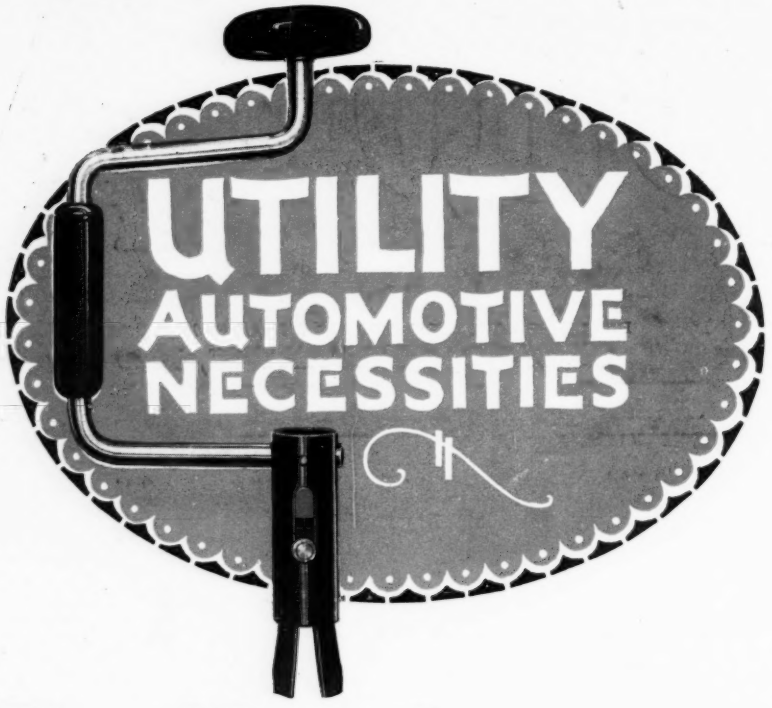

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The new 1920 model is all steel with handles and jaws which are indestructible, even in the face of rough usage.

Finished in black enamel and nickel. Packed in fibre board cartons of ten.

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MOTOR AGE

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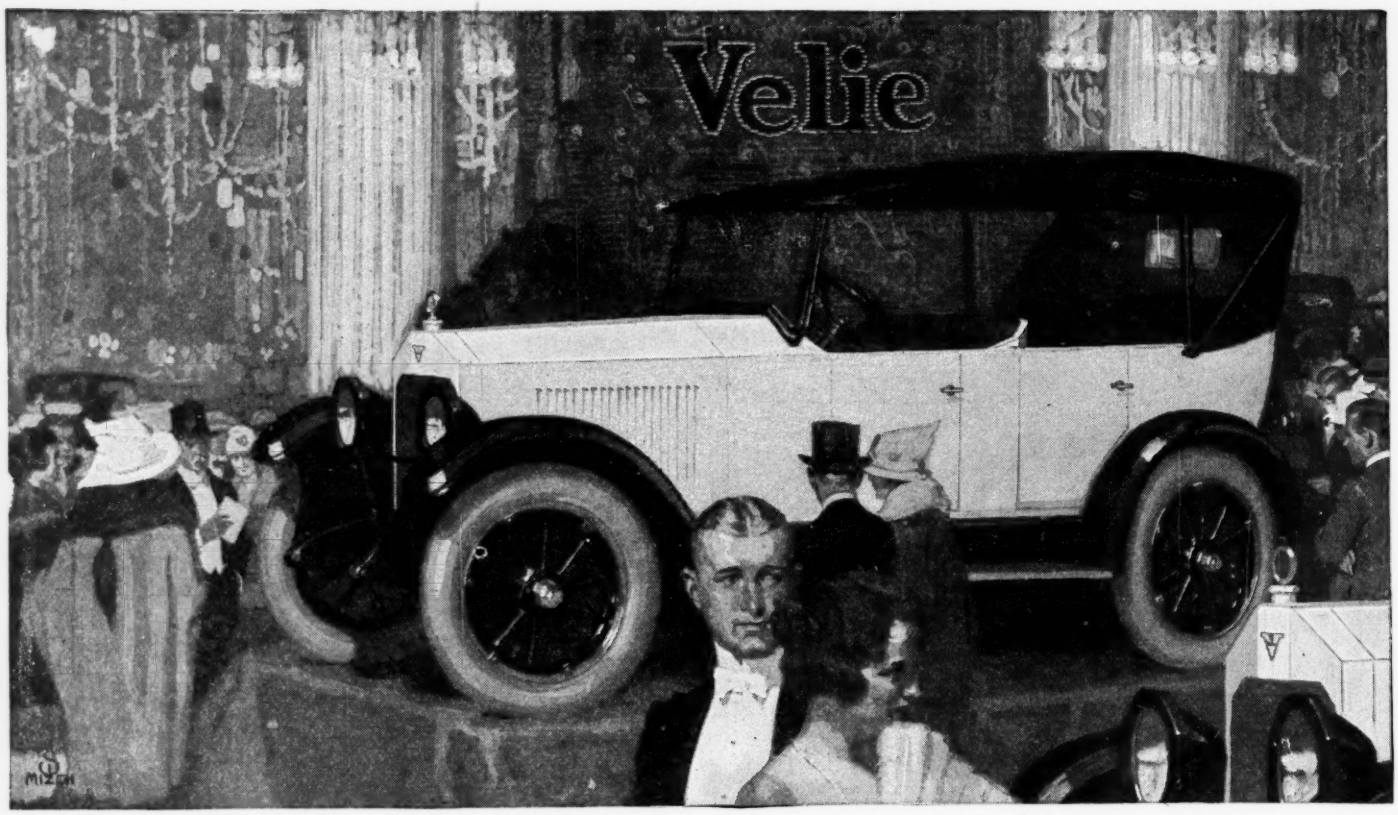

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NEVER in our history was a car the center of such interest and admiration as the New Velie in the Authoritative Style at the several Shows just concluded.

Crowds day and night inspected the new body lines so satisfyingly expressed in the harmonious combination of symmetrical planes.

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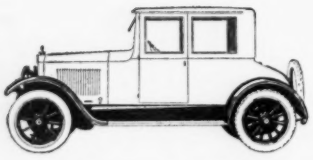
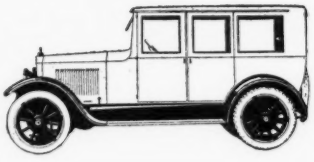
Then there is the newest **Velie Six**—shown for the first time. An attractive, sturdy and roomy five-passenger car—lower in price—of foremost quality—a fit companion to the larger Velie models.

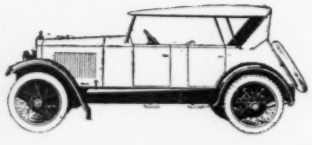
The demand has increased four-fold. We are expanding our production facilities to meet the situation. If your territory is not closed we suggest that you get in touch with us at once.



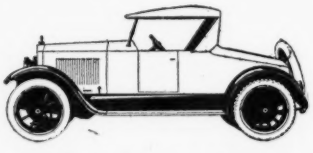
Four-Passenger Sociable Coupe



Six-Passenger Four-Door Sedan



Four-Passenger Speedster



Two-Passenger Touring Roadster

THE NAME INSURES THE QUALITY

VELIE MOTORS CORPORATION

113 Velie Place, Moline, Illinois

Builders of Automobiles, Motor Trucks and Tractors

The Mark of The New Velie Six

The Mark of The New Velie Six

Vol. XXXVII, No. 7 CHICAGO, FEBRUARY 12, 1920 $3.00 per Year

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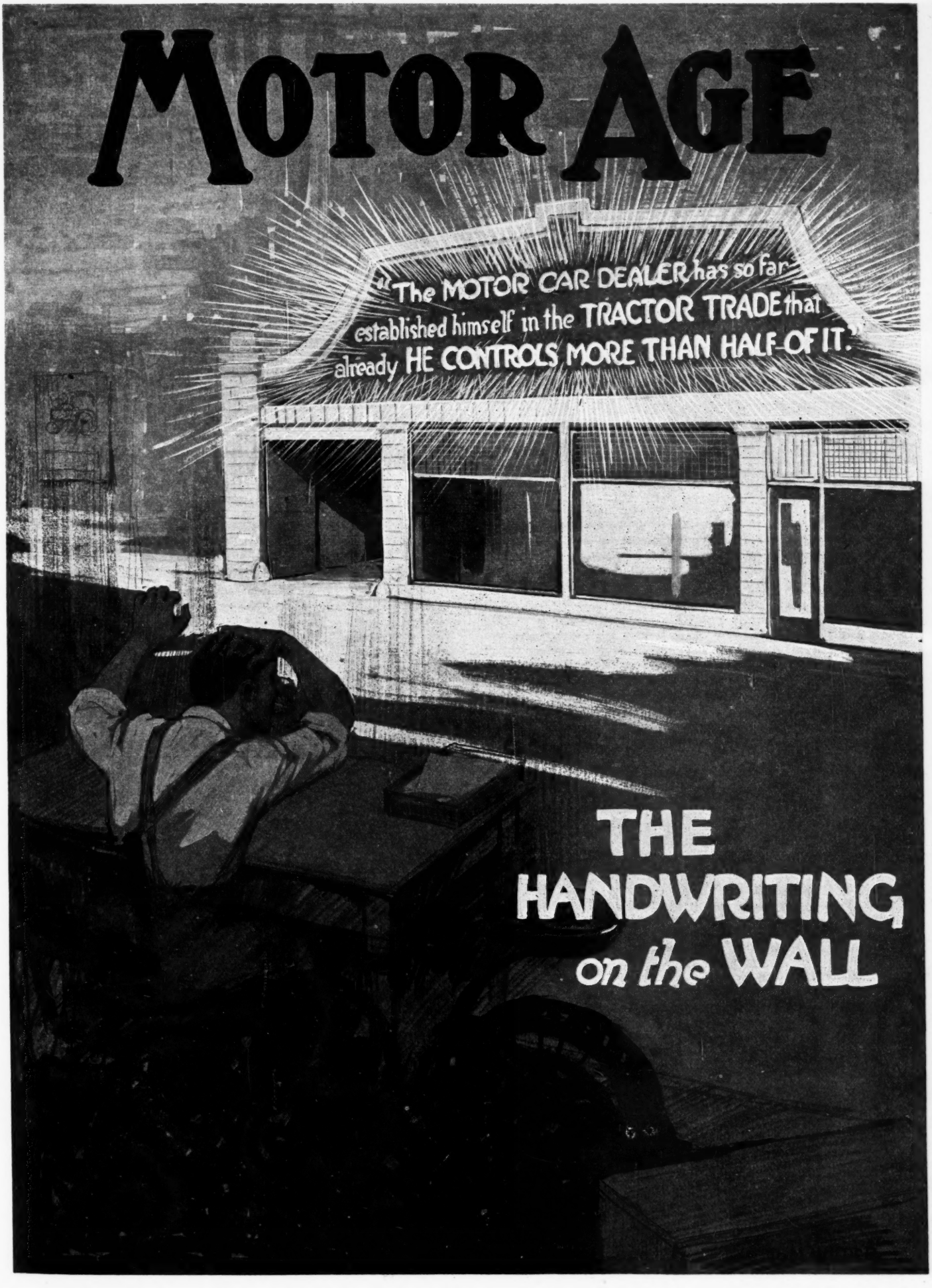
"The MOTOR CAR DEALER has so far established himself in the TRACTOR TRADE that already HE CONTROLS MORE THAN HALF OF IT."
THE HANDWRITING on the WALL

Study This Picture—It Means a Lot to You

IF any doubt exists in the minds of potential tractor dealers that power farming is not going to be one of the greatest industries the world over, he has but to look at this picture. Here we have two tractors and two men doing work that formerly would have taken perhaps half a dozen horses and many men.

On the left a tractor is pulling a machine which is cutting wheat and threshing it. The other tractor is drawing a wagon which collects the grain from the spout. The two tractors travel at the same speed and when one wagon is full it becomes only necessary to hitch an empty one in place of it. Think of the operations saved!

The point to remember is that as horses are replaced with power-driven and drawn machinery, the problem of service and maintenance becomes greater for the dealer. As the number of internal-combustion engines used for farming grows so will service have to grow. Delays are fatal at times when tractors or the tools for them are needed most. A car owner might limp to town on three cylinders with his car, but a tractor tied up in the field has to stay there.

Service will have to be brought out to it. And the dealer who is preparing to take out this service to a farmer without delay is the one who is going to help in getting power farming across properly.

Farmers are going to use motor trucks more and more. Isolated farm light plants are cutting quite a niche for themselves in the urban sections and all these have to be serviced. So when you think of power farming think of the above picture, of the motor truck and the light plant. It will then be easier to plan the great service campaign that must come soon.

Things of Particular Value to You in This Issue

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By B. M. Ikert
What are tractors going to be in the next few years? Is there any marked tendency toward machines of any particular type? If you are interested in tractors, you surely will be interested in Mr. Ikert's article.

Reviewing the New Tractor Models 17
There are numerous tractors on the market this year manufactured by new companies and new models made by the old companies. This article will tell you all about them, briefly.

Tractor Driven and Drawn Machinery 23
The tractor dealer must know more than tractors. He must know about the machinery which goes with tractors, for he will be called upon to supply this machinery if he hopes to remain long in the tractor industry.

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Fitments for the Tractor 26
The number of devices offered to facilitate or improve tractor operation are almost as numerous as for passenge rcars. A few of them are described in this article.

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Not guess, but know! He must not have any doubt about his business and he must not let his customer have any doubt about his knowledge.

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AUTOMOTIVE DEALERS DOMINATE TRACTOR TRADE

by Fred M. Loomis

Motor car dealers will control the distribution of a major portion of all the tractors which will be manufactured in 1920.

Motor car dealers will control to a greater or less extent the product of nearly every tractor manufacturer who will have large production in 1920.

Motor car dealers will control tractor distribution over a larger area than will any other kind of dealer during 1920.

WILL the motor car dealer, or the implement dealer or some other kind of dealer control the tractor trade? Answer: THE MOTOR CAR DEALER!

A lot of words has been spilled over this question without anyone getting very far except in the way of more or less acrimonious debate. Preponents for both sides commonly satisfy themselves with deprecatory remarks about what the other fellow may say, and neither apparently ever has thought to prove the truth of either one contention or the other.

Yet the answer to this interesting query lies right under the eyes of any one who will take the trouble to look. It rests upon facts which anyone can verify if he will. And facts are stubborn things. They have the advantage over words every time in settling any sort of a controversy and they can settle this particular matter beyond the peradventure of a doubt.

That is, they answer it as far as the present day organization of the tractor business is concerned. Furthermore, they are so firmly established that it is a fair inference that what is the case now will continue to be the case, only more so, as time goes on. For as the tractor trade is organized at this time it is doing quite well enough and there is every warrant in the world for letting well enough alone.

But there is more than that. Things not only are going along well enough, but they are moving along lines that have become well established, that have proven their reliability and dependability, that are eminently satisfactory to the parties most intimately concerned and only a trade cataclysm can change them now. Every day the present tendencies in the tractor trade become more pronounced and upon this assertion is based the claim that the question as to which sort of dealer will be the dominant type in the tractor trade is answered, definitely and positively for all future time by them.

The answer is that THE MOTOR CAR DEALER HAS SO FAR ESTABLISHED HIMSELF IN THE TRACTOR TRADE THAT ALREADY HE CONTROLS MORE THAN HALF OF IT AND BIDS FAIR TO BE EVEN A MORE IMPORTANT FACTOR IN THE FUTURE. HE dominates in number of tractor agencies; in number of tractors sold; in the number of selling organizations in the tractor trade in which he is an important if not a dominant factor; in possessing better and more modern business methods; IN BEING AS A RULE BETTER EQUIPPED TO RENDER THE NECESSARY SERVICE ON TRACTORS; in manifesting more aggressive selling methods; in controlling the distribution of tractors in larger areas; in measuring up better, in general, to the requirements demanded from the up-to-date tractor dealer. The motor car dealer, possessing all these attributes, has within two years, secured control of more than half of the tractor business of this country and has gained an impetus in the tractor business that nothing can stop.

This answer is proven true by facts. Some of these facts are:

MOTOR CAR DEALERS WILL CONTROL THE DISTRIBUTION OF A MAJOR PORTION OF ALL THE TRACTORS WHICH WILL BE MANUFACTURED IN 1920.

MOTOR CAR DEALERS WILL CONTROL TO A GREATER OR LESS EXTENT THE PRODUCT OF NEARLY EVERY TRACTOR MANUFACTURER WHO WILL HAVE LARGE PRODUCTION IN 1920.

MOTOR CAR DEALERS WILL CONTROL TRACTOR DISTRIBUTION OVER A LARGER AREA THAN WILL ANY OTHER KIND OF DEALER DURING 1920.

First, what is the probable production of tractors for the season of 1920? Answer: Something over 300,000.

The writer has had the privilege of comparing the results of two independent investigations regarding estimated tractor production for the coming year. One was made by MOTOR AGE and is very thorough. The other was made by a concern intimately and vitally connected with the tractor industry and which has every reason in the world for knowing as accurately as possible just how many tractors are likely to be built. This investigation also was made with extreme and painstaking thoroughness.

The results of these two independent investigations are:

In this story Mr. Loomis points out some startling facts as to who is going to handle the tractor trade of this country and who is going to be called upon to render the necessary service that must go with power farming. MOTOR AGE *has made an investigation regarding the tractor production for this year and figures that something like* 309,000 *tractors will be built. Independent figures total about* 319,500 *tractors. Based upon the figures of estimated production of the companies themselves and throwing all the unknown organizations into the implement scale, the percentages show that motor car dealers will control the distribution of* 144,000 *of the machines built in* 1920 *by the twelve concerns listed on the following page. Implement dealers and dealers of all other kinds will control* 118,500 *of them. Mr. Loomis also points out that motor car dealers will control tractor distribution over a larger area than will any other kind of dealer during* 1920.

Motor Age figures	309,000
Independent figures	319,500

Garden tractors and motor cultivators are not included in these totals.

These two lists show there are 72 tractor manufacturers in the country who will build 100 or more tractors for the season of 1920 and who therefore may be considered to be in production. Concerns reporting less than 100 complete machines are not included.

The term "production" is used here in a very elastic sense. It is applied to concerns whose maximum production will be as low as 100 tractors as well as to concerns which will reach a maximum production of 100,000 tractors.

262,500 Tractors from Twelve Concerns

Taking the Motor Age figures as the more conservative basis upon which to argue, the returns show that of the total of 309,000 tractors, 262,500 will be built by just twelve concerns. This leaves 46,500 tractors to be credited to the other sixty.

Anyone who is at all well acquainted with the tractor business can take a pencil and write down the names of these twelve concerns in a minute. There is little or no mystery about who they are or what their production will be.

Naturally, the first name put on the paper will be that of Ford. Everybody knows that Henry Ford & Son intend to build 100,000 tractors for 1920.

Starting them with Ford the list of twelve will look something like this:

Henry Ford & Son
International Harvester Co.
Samson Tractor Co.
Moline Plow Co.
J. I. Case Threshing Machine Co.
Avery Co.
Cleveland Tractor Co.
J. I. Case Plow Works Co.
Allis-Chalmers Co.
Advance-Rumely Co.
Hart-Parr Co.
Deere & Co.

Total production (estimated for the foregoing	262,500
Estimated production other sixty concerns	46,500
Total estimated production for 1920	309,000

Ignoring for the present the sixty concerns with their estimated production of 46,500, let us tell what there is known more or less positively about the proportion of motor car dealers to be found in the present day organization of the big twelve.

	Per Cent Motor Car Dealers	Per Cent Implement or Other
Ford	100	
International		100
Samson	50	50
Moline	25	75
Case T. M.	33 1-3	66 2-3
Avery	33 1-3	66 2-3
Cleveland	66 2-3	33 1-3
Case Plow	33 1-3	66 2-3
Deere		100
Allis-Chalmers	Unknown	
Hart-Parr	Unknown	
Advance-Rumely	Unknown	

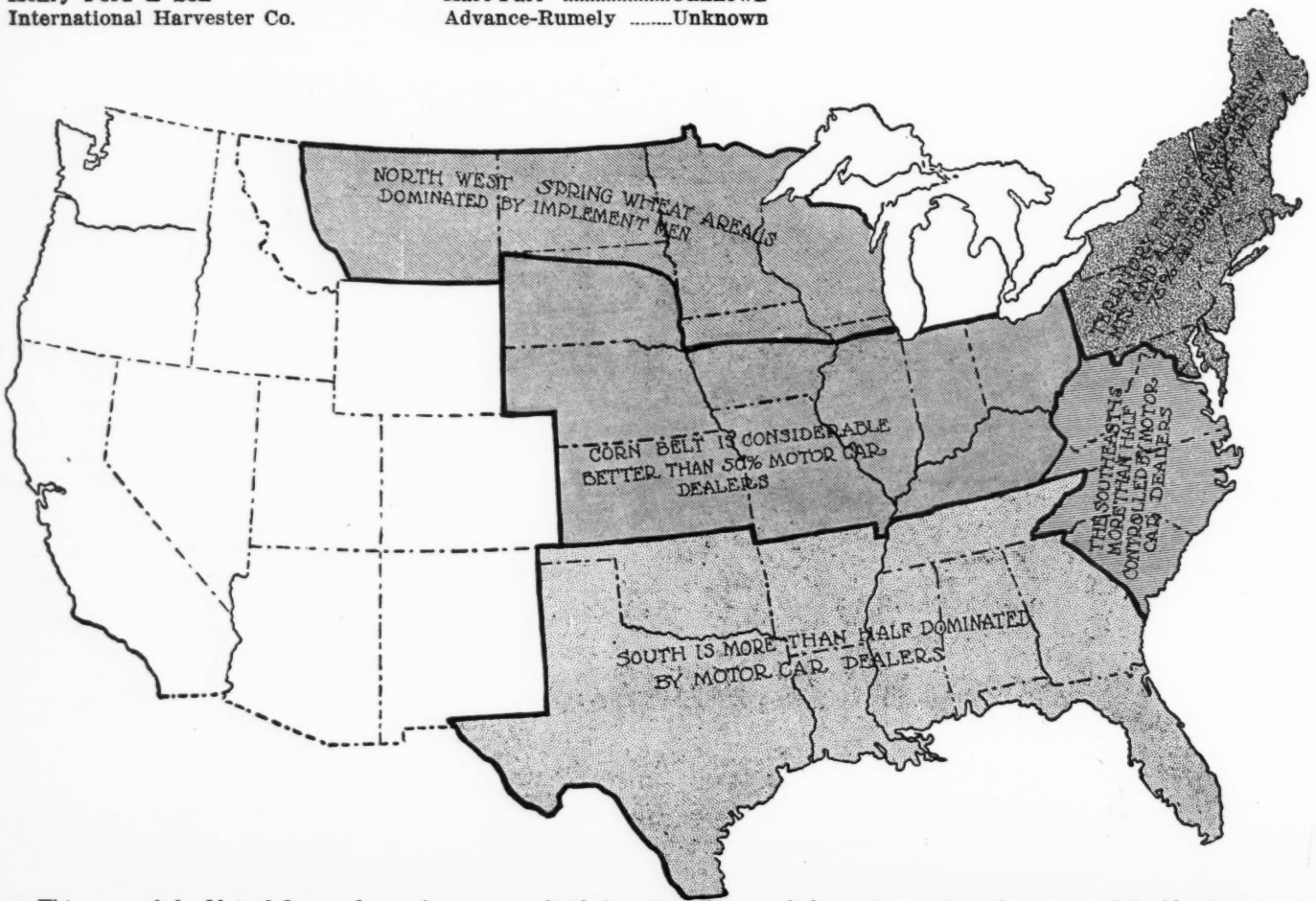
Based upon the figures of estimated production, given upon the authority of the companies themselves, and throwing all of the unknown organizations into the implement scale, these percentages show that MOTOR CAR DEALERS WILL CONTROL THE DISTRIBUTION OF 144,000 OF THE MACHINES BUILT IN 1920 BY THE TWELVE CONCERNS CONSIDERED, and that implement dealers and dealers of other kinds will control only 118,500 of them.

Absolute Figures Impossible

The writer is perfectly willing to admit—and to this extent his figures are subject to criticism or revision—that the percentages given are not absolute; that they are at the best reasonable estimates. It is impossible from the very nature of the case that they should be absolutely accurate. Nor is it at all necessary for the purposes of this argument that they be so. If they are reasonably close approximations to the truth they will stand, and it is confidently believed that most of them are not far out of the way.

Take, for instance, the cases of the International Harvester Co. and Deere & Co. These have been given as 100 per cent implement. The real truth is that both organizations are tinctured to a considerable extent by motor car dealers.

In the case of Advance-Rumely and also of Hart-Parr there is not only a respectable percentage of motor car


NORTH WEST SPRING WHEAT AREAS DOMINATED BY IMPLEMENT MEN
CORN BELT IS CONSIDERABLE BETTER THAN 50% MOTOR CAR DEALERS
SOUTH IS MORE THAN HALF DOMINATED BY MOTOR CAR DEALERS
THE SOUTHEAST IS MORE THAN HALF CONTROLLED BY MOTOR CAR DEALERS

This map of the United States shows the country divided up into the corn belt section, spring wheat area of the Northwest, etc., and shows the proportion of tractors sold by the automotive dealers

dealers in their organizations, but there also is a very heavy percentage of exclusive power equipment dealers who are neither motor car nor implement. Indeed, this kind of dealer is growing numerically and in importance at a rapid rate and he is destined to cut a very big figure in the future development of the tractor trade.

No accurate data is available at this time on the elements of the Allis-Chalmers sales organization.

Motor Car Dealer Leads Total Sales

Now as respects the sixty remaining concerns with the production of 46,500 tractors. Through personally acquired information the writer knows that many of them are relying largely on motor car distributors and dealers to find them a market. Others are relying largely upon the implement dealer and among them is found a percentage who are trying to develop the exclusive type of dealer. It is believed it will be fair to credit at least 33 1-3 per cent of these to motor car dealers.

In round numbers, then, these conclusions lead to the assertion that DURING THE YEAR 1920 MOTOR CAR DEALERS WILL DISTRIBUTE AT LEAST 160,000 OF ALL THE TRACTORS THAT WILL BE BUILT FOR NEXT YEAR, while implement dealers and exclusive power equipment dealers will account for 149,000.

This, of course, does not show any overwhelming preponderance of motor car activity, and no one in his senses ever claimed that the motor car dealer is the whole thing. But the significant thing about it is that the motor car dealer actually leads, and that is all any advocate of the automotive interests wants to claim.

Now as to territorial distribution of tractor dealers.

At the outset let it be admitted that the writer has no personal knowledge of what the conditions are on the Pacific coast. Hearsay evidence only must be relied upon for that section. For that reason no positive statement is made here about conditions out there. But regarding conditions in the remainder of the country he has knowledge which has come from personal investigation and he thinks he can advance his conclusions with authority.

Implement Dealer Leads in Northwest

The Northwest, meaning by that the spring wheat area, is preponderately implement.

The corn belt is considerably better than 50-50 in favor of the motor car dealer.

The South is considerably more than half in control of the motor car dealer, basing this conclusion largely on the makes and number of tractors that have been sold there.

The territory east of the Allegheny Mountains, including all of New England, is easily 75 per cent automotive.

The Southeast is more than half dominated by motor car dealers.

These, then, are some of the facts upon which MOTOR AGE bases its confident answer to the question with which this article opened. As the tractor trade is organized at the present time for distribution the more important factor is the motor car dealer. Nor does anyone who really has investigated the subject doubt that he will do better than retain the position he already has attained.

Power Farming
The One Subject we are All Interested in.
All Progressive Farmers Agree That it Pays.
Are YOU Well Informed on This Subject?
All Day Meeting
Saturday, Jan. 31st
Grand Theatre, Geneva
Starting at 9:30 a. m.
A Free Lunch at Noon
One of the most instructive meetings ever held in this community to explain the advantage of this improved method of farming.
Illustrated by Moving Pictures
All farmers are urged to come, meet their progressive neighbors and enjoy the hospitality of
D. S. HUBBELL, Elgin GEO. EKDAHL, Geneva
Fordson Tractor Dealers
Come to the Ford Salesroom at Geneva or Elgin and See Program

Here is an example of how some motor car dealers are getting the jump on implement dealers in power farming affairs. It takes little imagination to see that farmers will come to progressive tractor dealers who put on educational affairs of this kind for other things besides tractors

Best Dealer Wins Regardless

But after all is said controversy over what type of dealer will dominate finally in the tractor trade is more or less silly. The fact is that ultimately the dealer who will lead in any community will be the best man regardless of pedigree. There are hundreds upon hundreds of motor car dealers who never will be tractor dealers and they never ought to try to be. The same may be said of a certain proportion of the retail implement dealers. And, in contrast with these two negligible classes, is the class of exclusive power farm equipment dealer which is coming so strongly and which traces its training back neither to the motor car nor to the implement industry.

The nail was hit squarely on the head the other day at Milwaukee by A. T. Jackson, sales manager the Emerson-Brantingham Co. He said:

"It is a case, however, of the survival of the fittest, and with the tremendous demand for tractors, manufacturers are seeking and must find an outlet."

That's it—the survival of the fittest. One of the companies which today has one of the largest and most productive of all of the tractor sales organizations in the country, when building up its clientele of dealers, said: "That dealer, whoever he is, who shows the necessary pep to come after an agency and who can prove to us he has the qualifications we demand, is the man who will get the chance to sell our tractor in his locality."

Performance Counts

The criterion the manufacturer will rely upon is the criterion of performance. What the manufacturer wants and will have is results. Hundreds of present day tractor dealers, both motor car and implement, are holding their agency franchises at this time upon terms which are purely probationary. They are being tried out. If they do not measure up to requirements they will be thrown aside just as is a worn out glove and the manufacturer won't care a hoot whether they came originally from the motor car or the implement camp. It is up to the individual dealer to make good.

One consideration which has been favorable to the implement dealer in comparison with the motor car dealer has not been touched upon. This is the natural preference a large percentage of

the tractor manufacturers have for the former. This preference is founded upon past business from its very inception and by this time he should have been impregnably entrenched therein. How and why he failed to measure up to his opportunity is too long a story to tell here, nor is it necessary it should be told. The facts as they exist to-day furnish sufficient commentary. Instead of controlling the trade to the practical exclusion of dealers of all other denominations, the implement man finds himself to-day compelled to struggle to retain even that portion which he has managed to retain up to this time.

Motor Car Dealer Wins On Merit

NO NATURAL PREFERENCE FAVORED THE MOTOR CAR DEALER. Upon the contrary he was hardly recognized even as a last resort. Whatever he got was given to him with more or less of reluctancy upon the part of a large element in the tractor manufacturing world. The manufacturer turned to him as his second choice and IF THE MOTOR CAR DEALER MADE GOOD HE DID IT IN SPITE OF THE EXPECTATIONS RATHER THAN IN ACCORDANCE WITH THE EXPECTATIONS OF THE MANUFACTURER.

What the motor car dealer has won in the tractor trade has been won in the face of prejudice, opposition and criticism. That he has made good is one of the most firmly established of all the facts in the farm operative equipment trade. WITHIN THE BRIEF SPACE OF TWO YEARS HE HAS CINCHED HIS HOLD UPON MORE THAN HALF OF ALL THE TRACTOR TRADE there is and today, instead of being regarded as more or less of a doubtful dealer experiment, he has established his right to claim to be the best tractor dealer the manufacturer can have. And as such, the manufacturer, convinced against his will perhaps, consciously is seeking him as a desirable representative.

The motor car dealer is perfectly willing to rest his case for preference upon the criterion of results. That many dealers have failed to make good is no reflection upon the body of motor car dealers as a whole, as it was inevitable that many incompetent dealers should jump into the business at first. These have been for the most part weeded out, leaving those motor car dealers who now are experienced tractor dealers and who have learned how to be successful in the hard school of experience. These dealers have fully justified themselves. Already they control more than half of the tractor trade of the country and surely this is enough of achievement of which to boast at this time.

It remains only to speculate upon what the aspect of the tractor trade will be five years hence if the same tendencies which for the last two years have been at work favoring the motor car dealer continue to work. And who really has an honest doubt that they will keep working?

How the Implement Men Feel About It

In connection with what has just gone before it is interesting to note what was said and done at the Thirty-First Annual Convention of the Western Retail Implement, Vehicle and Hardware Association held at Kansas City recently. It seems the hardware men are making money out of other features of their business and they want to make money out of their tractor business also. They have concluded this cannot be done without giving prompt service on repairs and parts and they cannot make money on the service departments without larger discounts.

SEVENTY-FIVE per cent of the time, and 85 per cent of the attention, at the convention were devoted to tractors.

Ninety per cent of the implement dealers present had tractor contracts.

Ninety per cent of the tractor dealers were dissatisfied.

Thirty per cent of the tractor dealers had a fairly profitable business, counting tractors as one element of the business.

Ninety per cent of the tractor dealers were convinced that service is the basis of sales; and that service cannot be given without larger discounts.

Ten per cent of the tractor dealers present sell many tractors, profitably.

Ninety per cent of the tractor dealers present, sell small numbers of tractors, without much profit.

Implement dealers, as the facts were disclosed at this convention, have within a year or 18 months, suddenly jumped to the decision that the tractor business belongs to the implement trade. We say "jumped," because even a year ago, interest was only beginning to be aroused; the number of tractor dealers among the members of this association was comparatively small—and these dealers were feeling their way. This year, the convention was openly and even vociferously committed to the policy that the implement man must handle the tractor trade—must be the power farming equipment dealer of his community. Further, the convention was committed to the policy that the implement trade must work out with the manufacturers the best methods, the best details of contracts, for handling tractors.

The earnestness with which one after another of the dealers urged the NECESSITY OF ADEQUATE SERVICE, as the basis of sales, was a new note in these conventions—and an indication, perhaps, that the implement dealers are getting a new slant on their opportunities and responsibilities; as tractor dealers. There was almost unanimous agreement that the dealer should stock repairs and parts; that he should give the service.

The obstacle to any conclusion that implement men were going to stock tractors and parts; were going to give service, was this: The dealers want the manufacturers to give larger discounts on both tractors and parts, to compenstate the dealer for stocking parts and for service.

Several of the successful tractor dealers among the implement men minimized the matter of discounts; they laid stress, however, on the handicap involved in C. O. D. shipments of parts, which involved often a delay in serving the tractor owner.

The dealers who spoke on the subject, frankly admitted the validity of discounts, on both tractors and parts, as heretofore given, in view of the help extended by manufacturers on sales and service. These declared, however, that THE SUCCESSFUL DEALER MUST PLAN AND PROVIDE TO DO HIS OWN SELLING, AND EXTEND HIS OWN SERVICE; and that when he does take over the entire burden of selling and serving, he should receive a larger discount from the factory.

Few Orders at Convention

"The implement convention did not produce a large amount of orders for tractors and equipment," said one distributor. "While the larger number of our dealers are implement men, this number sells a smaller volume of our tractors. Aggressive selling and adequate service as to tractors by implement dealers is more in evidence this year than last; but the large majority of the implement dealers have not yet got well started in the profitable and efficient distribution of power farming equipment. About 50 per cent of our business for 1920 is booked, we estimate. And our business so far is 100 per cent ahead of last year, in the power farming department. The increase in prompt ordering is largely credited to the NEW DEALERS TAKEN ON IN THE PAST NINETY DAYS, AND TO THE ALERTNESS OF THE TRACTOR DEALERS WHO HAVE NOT BEEN IN THE FARM IMPLEMENT TRADE."

Sales Managers State Some Facts

The sales managers did not compliment the dealers fulsomely. They made it plain that the manufacturers had expected the implement dealers to sell tractors and power farming equipment; the implement dealer is logically a part of the great organization for supplying farmers with necessary equipment. But —because implement dealers did not expect farmers to buy motor cars, A LINE OF MOTOR CAR DEALERS SPRANG UP, WHO NOW ARE IN MANY CASES TAKING HOLD OF TRACTOR SALES WHICH IMPLEMENT MEN ARE SO OFTEN NEGLECTING. The motor car dealers who do not qualify for fullest co-operation in the distribution of tractors, are being dropped—just as the implement dealers who do not qualify have to be dropped.

THE FOUR WINDS OF TRACTOR DESIGN

More Attention Is Being Given the Subject of Bearing Layouts. Cast Steel Parts Replaced by Drop-Forged. Hot-Spotting Still in Infancy

A Dozen Predominating Features of Tractor Trend

1—Roller and ball bearings inclosed in dust-tight housings rapidly are replacing the old type of plain bearings on tractors.

2—The tractor industry is paying more attention to bearings and is buying a higher grade of bearing than ever before.

3—The water type of air cleaner rapidly is replacing all other types.

4—The cast iron steel type of radiator with a tubular core is becoming more popular each year on tractors the same as it has done in the truck industry.

5—The old time cast steel front axle is giving ground to the drop forged type.

6—Some manufacturers are equipping their tractors with heavier tires on the drive wheels which reduces the compression pressure per square inch under the rear wheels and eliminates soil packing.

7—There is a strong tendency for more convenient location of operating levers and foot pedals.

8—Both the horizontal type and vertical type of engine is popular in the tractor field, the latter predominating principally because there are more tractors numerically of this type.

9—There remains considerable more work to be done in the way of hot spotting to take care of heavier fuels.

10—A strong tendency is exhibited toward a full force feed lubrication system.

11—Crankshafts are hollow and therefore naturally large in diameter, producing an exceptionally stiff shaft that is proof against torsional vibration.

12—Influence of aluminum used for pistons is not yet being felt in the tractor engine field.

BY B. M. IKERT

STRICTLY speaking there is no decided trend in tractor design right now. If there is any semblance of a trend it is toward the betterment of the product, that is the general design and constructions that have featured tractors for the past two years or so reman essentially the same but details have been refined.

Roller and ball bearings inclosed in dust-tight and oil-tight housings rapidly are replacing the old type of plain bearing on such parts as front wheels, rear wheels, transmission shafts, in fact anywhere on the tractor where revolving surfaces and friction are involved.

In former years when we had the slow clumsy tractor in which weight and mass were not seriously considered plain bearings were half way permissible, but today the tractor makers find it absolutely necessary to use anti-friction constructions to get greater efficiency and it is indeed a difficult thing to find a tractor of the present day that usese plain bearings exclusively.

Anti-Friction Bearings Used Extensively

When anti-friction bearings first made their appearance on tractors it was in the track rollers or on the bull-pinion shafts. Then followed their use in transmissions, rear wheels, belt pulleys, etc. Now there is quite a tendency to put them in front wheels, fan mountings, etc., a good example of the latter being shown on this page. Aside from making the tractor more efficient, the use of anti-friction bearings allows the tractor maker to use smaller parts and better materials.

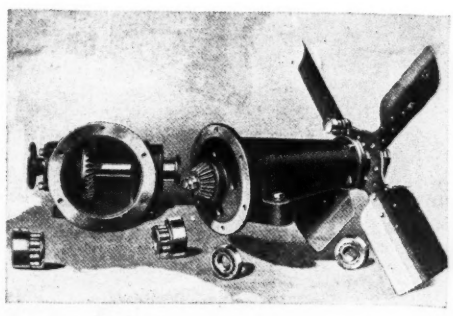
From an engineering standpoint the carrying capacity of a roller bearing is about four times as great as with plain bearings on the basis of pressure per square inch. Thus a bearing in a tractor transmission layout to carry a load of 2000 lb. would, if made in babbitt, take a shaft something like 2 in. diameter and the bearing would have to be close to 5 in. long. Use of a roller bearing would take a shaft about 1⅜ in. in diameter and about 2¼ in. long.

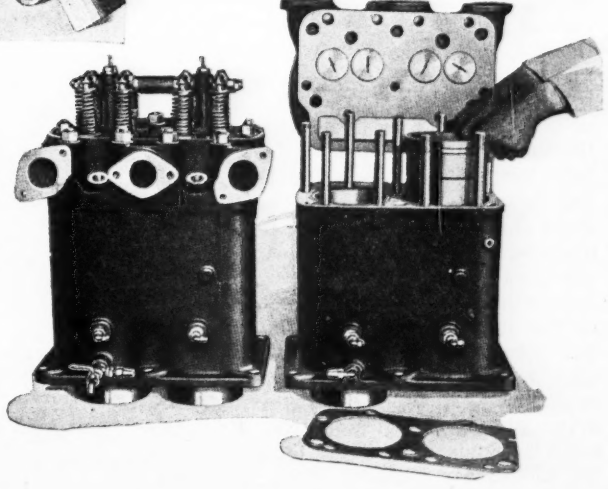
Then there is the service question, which in tractors is of vast importance. Much time is saved in factory assemblies and field service by use of anti-friction bearings, which does away with all pouring and scraping operations and troubles incident to them. The higher initial cost of the anti-friction bearings easily is offset in the longer life of the tractor and the easier maintenance.

Investigation shows that the tractor industry as a whole is paying much attention to bearings and is buying a higher grade of bearings than ever before. It also is becoming more and more recognized that the greatest enemy to bearing life is dust and grit and the tendency is to protect bearings much better than the original designs called for by use of felt washers and metal dust-proof caps. There is a wider use of bearings that take thrust in both directions and toward the installations of bearings with a greater carrying capacity.

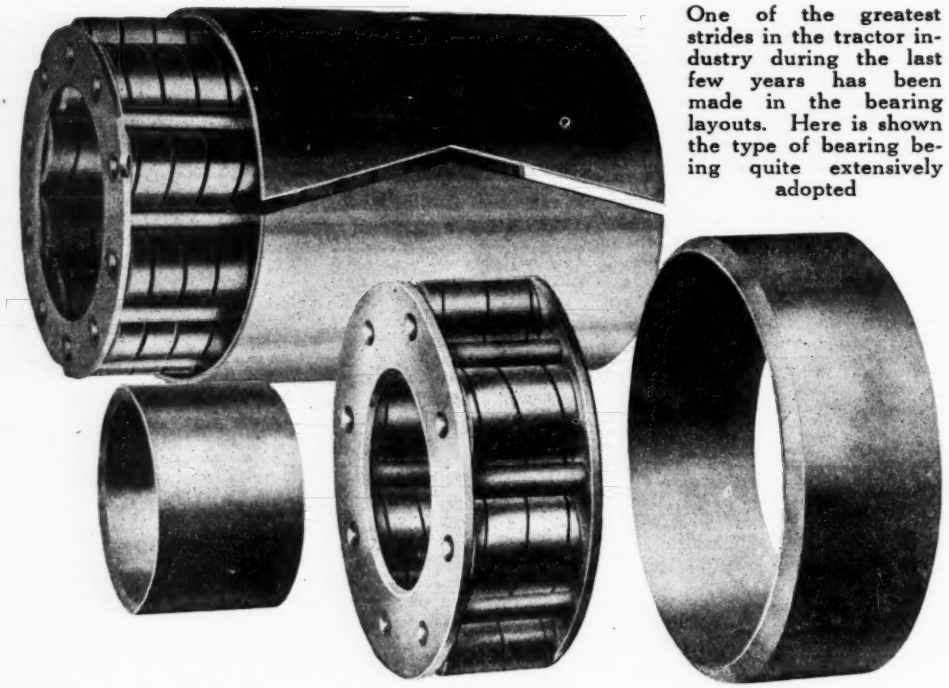
Takes Thrust in Two Directions

One of the bearings shown herewith will take thrust in both directions and thus locate a shaft for end play from one end only. The other end of the shaft may then be carried on another type of bearing. This sort of mounting is especially desirable where there are varia-





The upper view shows the fan layout on the Case tractor and is a good example of what is being done in the way of inclosing parts to protect them from dust and grit. Ball and roller bearings are used throughout and the drive does away entirely with belts. At the right is shown the detachable cylinder heads on a Case engine and illustrates the ease with which the valves can be gotten at. It also shows the removable cylinder barrel one of which is being slipped out



One of the greatest strides in the tractor industry during the last few years has been made in the bearing layouts. Here is shown the type of bearing being quite extensively adopted

tions in the machining in the length of the shaft and the distance between the housings, or where the temperature of the shaft and the housing may increase or decrease under working conditions, causing a change in the relative lengths.

Regarding air cleaners for tractors, there has been a decided tendency for the water type of air cleaner. In fact the only change made in the International Harvester tractors this year is in the substitution of a water type cleaner for the original wool-lined drum used as a cleaner. Air cleaners are an absolute necessity on tractors and they have been refined to a considerable extent. In one make the air is not passed through the body of the water, so that the latter remains comparatively at rest, thus allowing the solid matter that has washed out of the air to settle in the bottom of the reservoir, from which it readily can be drained.

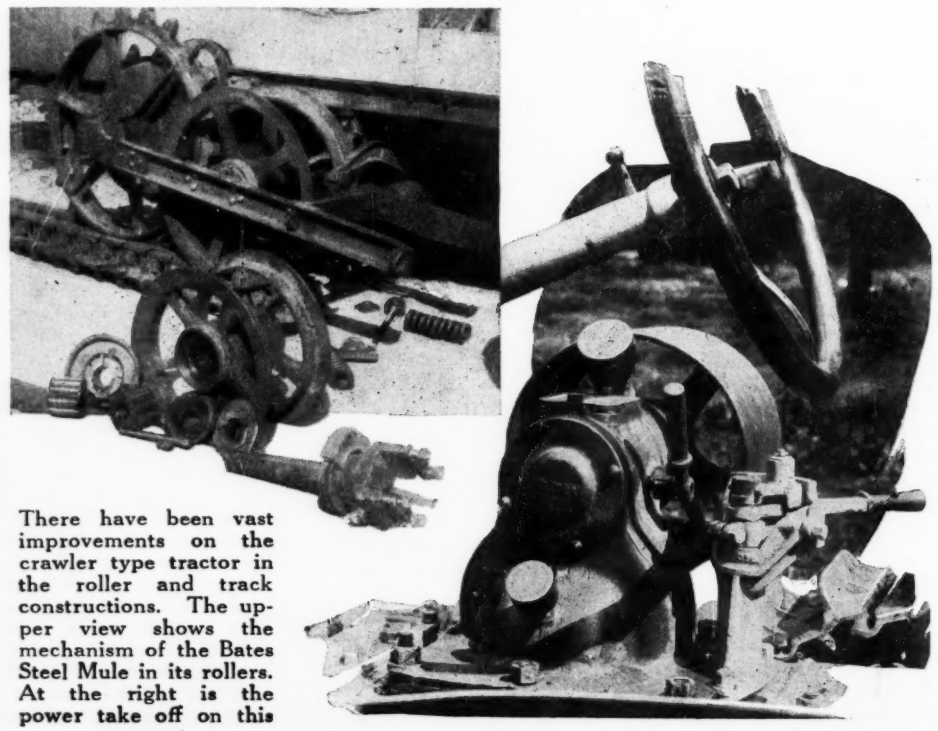
Radiators More Durable

Evidently the tractor designers are taking hints from the truck makers in the way of radiators. In place of the former built-up honeycomb type we are seeing more and more radiators of the cast-iron shell type of tubular construction. This makes a more durable job for tractors and besides is more easily repaired or cleaned. Usually the head of the radiator is detachable, so that the tubes can be cleaned of foreign matter. Inspection of some of the present day tractor transmissions shows that there is still considerable opportunity for manufacturers to provide means to keep out sand and grit. Nothing will make a tractor short-lived so much as exposure of the working parts to sand. It does not mean that only the engine parts should be inclosed, but those subjected to abnormal wear, like the steering gear, drive pinion, wheel spindles, etc. On some transmission designs the gear shifting shafts are exposed when the lever is in certain positions and at other times housed within a case. It does not take much imagination to see what happens on a layout like this. The sand collects on the ends of the shifting shafts by virtue of the oil or grease thereon and ultimately is carried into the case. The combination of grease and sand makes a gritty substance which acting as a cutting compound will enlarge the hole through which the shaft works and gives the sand all the more chance to get into the gear box or transmission. It seems a suitable cover of some kind which might be light stamping or sheet iron cover with a gasket between it and the case will go a long ways toward eliminating troubles from this source.

Front axles on tractors have come in for quite a number of refinements and changes and it is noteworthy that the old time cast steel front axle is giving way to a drop-forged type. Here again we can see where the development of the passenger car and truck have been instrumental in shaping the destinies of tractor design. Some manufacturers are equipping their tractors with heavier tires on the drive wheels and constructing these wheels in such a manner that the spokes are relieved from torsional strain. The increased width of the tires reduces the compression pressure per square inch under the rear wheels which lessens soil packing when driving over plowed ground. It is becoming more and more the case to equip tractors with fenders, and making operating conditions much more comfortable for the driver. Heretofore the arrangements of the operating levers, foot-pedals, and seat have been a sort of afterthought with the designer, but the tendencies on to-day's tractors is to fit such attachments as leather upholstered seats, sunshades and making the levers more convenient to operate.

Horizontal or Vertical Type Engine?

So far there is nothing to indicate as to whether the vertical engine or horizontal engine is going to dominate the tractor field. All of the horizontal type tractors of a year or more ago are still in production and there is nothing that seems to spell their immediate erasure from the market. It is quite true that in numbers the vertical type of engine predominates the field at the present time, but this is principally because more tractors numerically have been built with this type of engine. In other words all the companies having large productions use the vertical engine with the exception of one concern.



There have been vast improvements on the crawler type tractor in the roller and track constructions. The upper view shows the mechanism of the Bates Steel Mule in its rollers. At the right is the power take off on this tractor

Certain definite channels seem to be open at this time, all leading to the sea of kerosene, which must be successfully navigated before complete and satisfactory operation can be secured with low grade fuel; for this is the one big obstacle that engine designers must overcome. Engine operation is dependent upon it. Successful serviceing is dependent upon it. In fact everything connected with the tractor and its operation is dependent upon it.

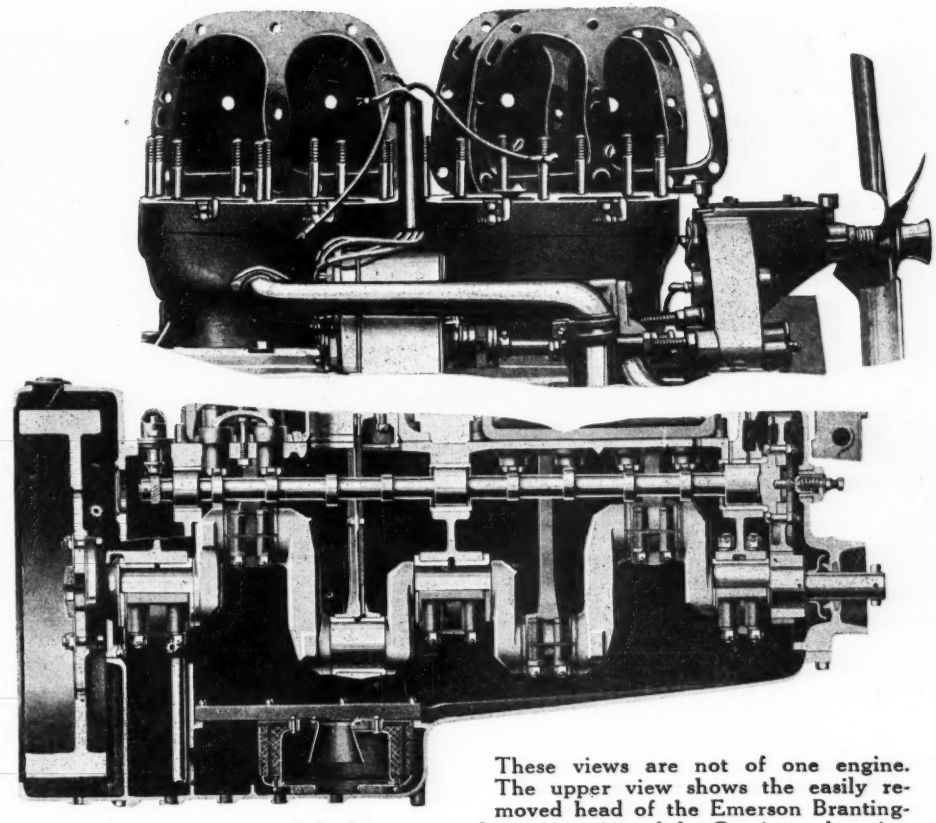
Hot-spotting seems to have reached its limit of application. There is only so much heat that can be obtained from a hot spot, and while the hot spot is evidently much better than the intake manifold construction where complete jacketing with hot gases is employed, as far as volumetric efficiency is concerned, still the hot spot is lacking, too.

It seems like one is trying to find trouble when attributing causes of faulty operation to the fuel. But this is not the case. The main bearings of the engine, the cylinder walls, the valves, the lubricating system, the oil gage, and the rest of it, are all affected by the fuel.

Low-Grade Fuel Causes Trouble

To see why this is so. With low grade fuel the tendency is toward a wet mixture, which tends toward a scouring action of the inside of the engine, removing the film of oil from the walls and thus spoiling lubrication. The mixture is forced down between the pistons and the cylinder walls to the crankcase where it dilutes the lubricating oil. This causes inadequate lubrication. A thinned oil is incapable of maintaining a film between the metals of the bearings, and the consequent result is that the bearing metal wears out. A thinned oil is not handled with the same facility by the oil pump, neither does the oil gage register as correctly as it should when the oil is thinned down considerably. So these are only a few of the considerations that have to be borne in mind when the trend of tractor engines is discussed.

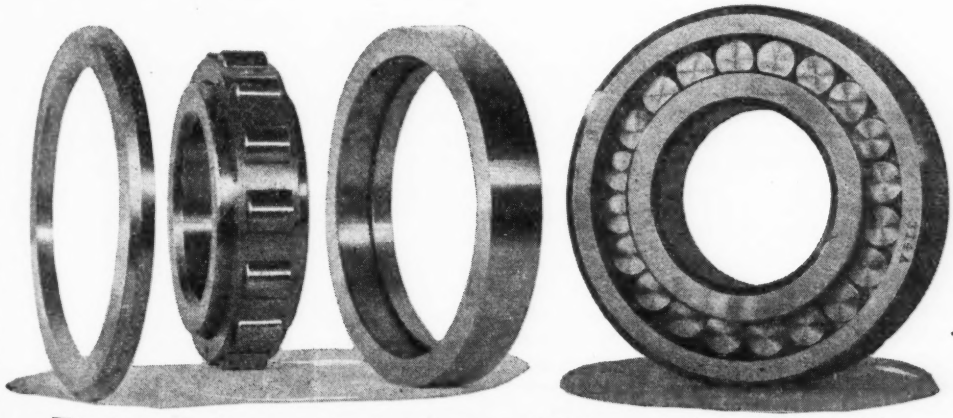
To see how application is being made to combat these evils, we find that practically all tractor engines have a removable cylinder head. Operation with heavy fuel in the hands of a man not conversant with the ways of the tractor engine, is likely to cause carbonization. With the view of reducing the tractor's idle time, the time that is laid up for removal of this carbon, a detachable cylinder is fitted. It can certainly be predicted that this will become standard feature of tractor engine design.



These views are not of one engine. The upper view shows the easily removed head of the Emerson Brantingham tractor engine, and the lower view shows a section of the Continental engine with full force feed lubrication. Here even the wrist pins are lubricated by pressure feed, the oil being supplied through the small pipe secured to the flange of the connecting rod

There seems to be a tendency among companies producing tractor engines, to design two engines, of the same stroke but with different bore, thus making it possible to use a commonly constructed crankcase and crankshaft. This construction makes it necessary to use a two-piece crankcase, with removable cylinder blocks.

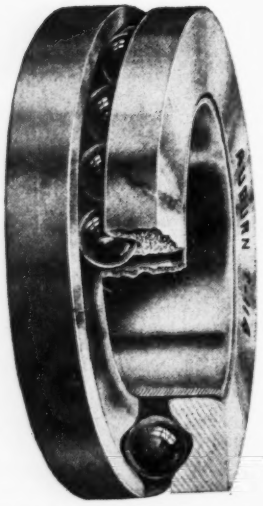
Lubrication is a subject that is receiving very careful thought these days. The trend, especially in the larger sized tractor engines, and which is also noticeable in the smaller sized tractor engines, is a full force feed lubrication system. A gear driven gear pump is usually employed, whose purpose it is to force the oil through the drilled crankshaft to the crank throws where it serves to lubricate the crankpins. So thorough has the lubrication been worked out on some tractor engines, that wrist pin, and the cam shaft bearings are fed with oil under high pressure. The success of a system of this kind is, of course, dependent upon the ability of the pump to supply oil continuously, without any appreciable diminution. To this end the gear driven gear pumps are being made very accurately. The fit in the surrounding casing is made very accurately. The type of lubrication system also has a great deal to do with the amount of internal power which is required to run the engine. Every engine, as everyone knows, absorbs some of its own power to turn its parts and the amount of this internally absorbed power is controlled to a large extent by the bearings and the manner in which they are lubricated.

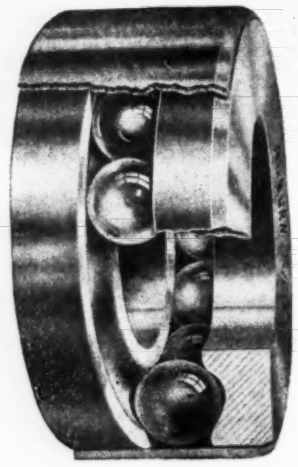


This shows another type of roller bearing said to be particularly well suited for carrying heavy loads such as encountered in tractor work

Fuel Problem Must Be Considered

Returning again to the question of fuel and mixture heating, for this is not a subject that may be dismissed with a few passing remarks. The two methods in vogue are, as was said before, the hot spotting and the general intake manifold heating with exhaust gas. Judging from the work that is being done in the regard of securing better heat application, and





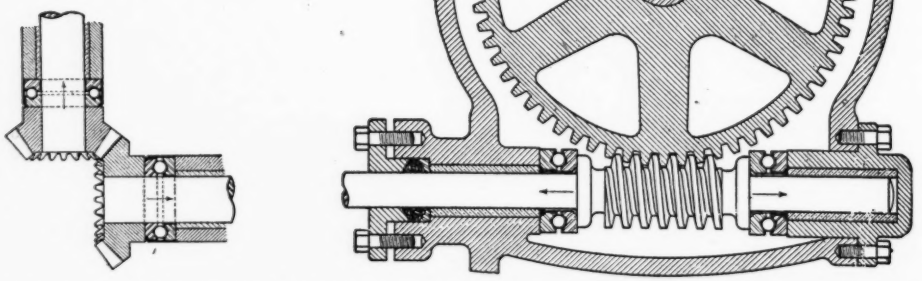
Two types of ball bearings used in tractor work. Above is an open type which receives its lubrication through the split in the ring as shown. The other type is an inclosed ball bearing frequently used back of bevel gears

by the frenzied search for something new that is going on in all the large experimental laboratories, it is hardly fitting to say that the two present systems are entirely acceptable. To show how serious has become this problem of the fuel, let us refer to the work that has been done by J. G. Vincent, of Liberty engine fame.

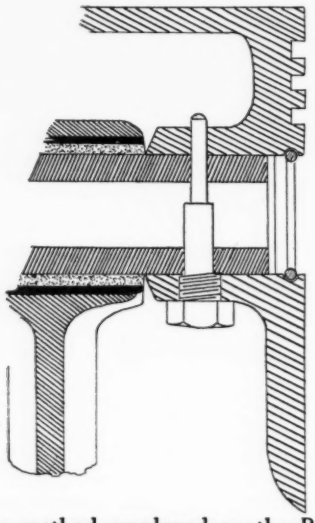
Heating the Mixture

Mr. Vincent has devised a scheme that by-passes a small part of the mixture from the carbureter, around the butterfly valve, and before re-injecting this mixture back into the manifold, passes through a burner in parallel with the main carbureter, after which these hot burnt gases are allowed to mix with the incoming main supply. When such original departures from the standard practices are made, and especially when they are made by a person of the fame of Mr. Vincent, we may rest assured that the future of the heat treating of the fuel and the mixture is at some distance from the final solution, if there ever be a final solution.

Accessibility if not worked to death, will be a factor that will determine the despatch of the serviceing. There is such



A bevel gear drive layout and worm drive using the type of bearing illustrated at left



The method employed on the Buda engine to insure that the wrist pin can be replaced in one direction only

a thing as too much accessibility. Engine parts made so that they can be replaced in either of six or eight ways, when they might just as well be made easily removable, and replaceable in only one way will undoubtedly receive more consideration from the designer in the future. A good example of careful thought in this respect is shown in the illustration, which is a scheme worked out by the Buda engineers. The stepped screw that holds the piston pin in place permits the wrist pin to be replaced in one way only. The reason for this is that wear, which is no respecter of dimensional entities, never wears evenly. A piston pin that has been in service a short while acquires a certain relationship for the parts that it co-ordinates with. Consequently if the pin is replaced so that this co-ordination is disturbed, the pin and piston will be out of line and will cause a more uneven wear, and a probable loss of compression.

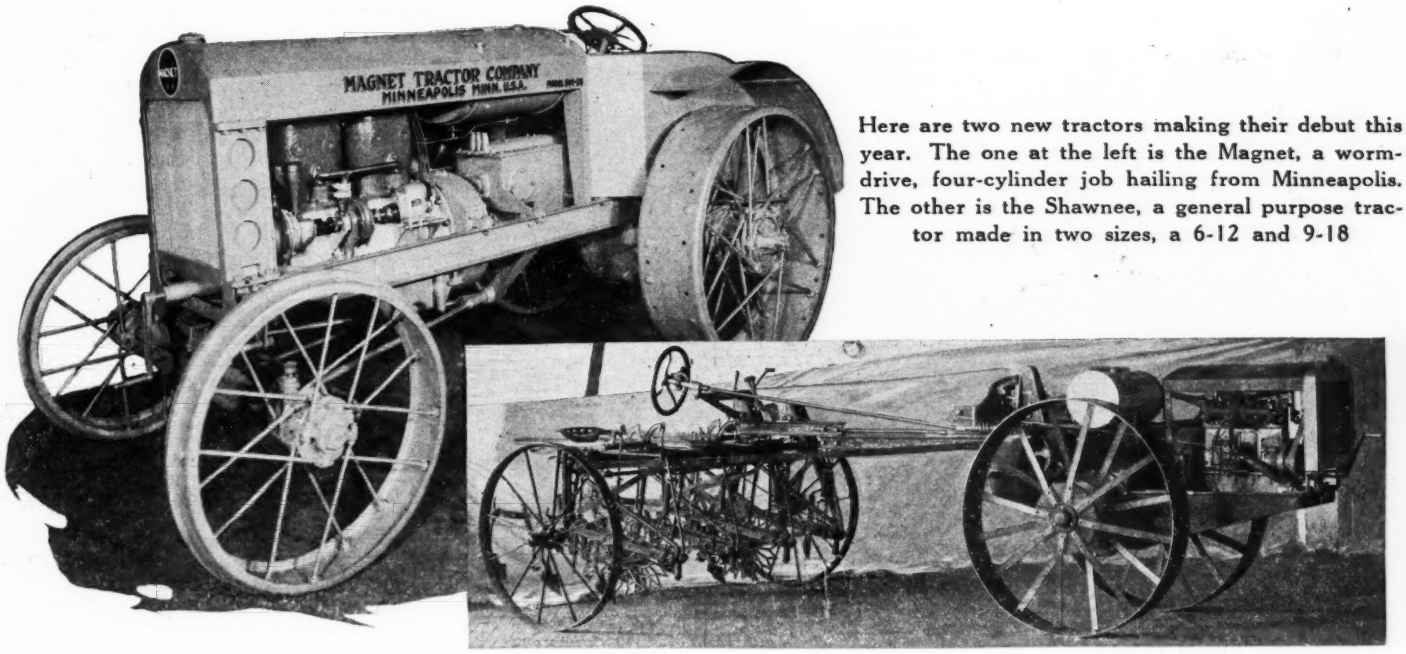
Tractor Bearings Get Hard Service

Bearings in the engine of a tractor are subject to a lot of abuse. They are called upon to stand up without oil, and with oil that has become diluted to the point where it can not lubricate. They are overhauled by so-called repair shops where the bearing will be tightened to the extent where a full grown man cannot turn the engine over. The result is that the engine will be turned over forcibly by special machinery until "she wears herself in," as they say. There is an injurious effect resulting from this practice. A bearing can not be so good that it will stand up under all the varied treatments that a tractor engine bearing is subjected to. Still, notwithstanding the ill abuse to which these bearings are put, wonderful strides are being made in bearing construction. It should be pointed out at this place, that bronze backed bearings are being used more and more and undoubtedly the future will see a greater trend toward their complete adoption. The one difficulty of a bronze backed bearing is that, if not carefully made, the Babbitt metal will separate from the bronze. One company that the writer has in mind is now making bearings of this type that can be hammered flat and pounded to most any shape with the Babbitt rigidly adhering to the surface of the bronze. Dissipation of the heat generated in the bearings is a factor that enters into the life of the bearing, and the way in which this is being met, is by closer manufacturing limits.

Aluminum in the Tractor

Just how much the future of the tractor engine business is going to be affected by the use of the aluminum alloys, we can not say. Light weight is after all not the prime requirement in tractor practice. Acceleration is not so essential as is plain, stubborn, brute strength, that can outlast any day's work. In a motor car where acceleration is a prime requisite, extra weight is burdensome baggage, that requires excessive power to speed it up. In a tractor, properly applied weight means so much strength, and while it represents a potential junk value, that skillful design could materially decrease, still there is a good reason for the weight. So it is with a tractor engine. A crankshaft that looks large enough to turn a mountain over, is not an example of misproportioned dimensions. The weight is there to lend rigidity to the shaft, to prevent vibration, to increase the bearing life, and thus decrease the service cost.

As far as inclosure is concerned, what has been said previously with regard to running gear inclosure applied equally as well to the engine. Inclosure complete, and as dustproof as it can be made is the only solution of the tractor engine business.



Here are two new tractors making their debut this year. The one at the left is the Magnet, a worm-drive, four-cylinder job hailing from Minneapolis. The other is the Shawnee, a general purpose tractor made in two sizes, a 6-12 and 9-18

Reviewing the New Tractor Models

Everything that is New and Up to the Minute Will Be Shown at Kansas City Show—Experiments of Last Year Have Stepped Into Ranks of Tried Products

ONE reason why the Kansas City tractor show will attract a throng of interested visitors is because there will be shown, comprehensively and comparatively, all that is up to the minute in tractor design and construction. There will be any number of machines which have stood the test of the farm—old friends whose dependability and reliability have been determined and which can be improved much only in the matter of minor details.

There too will be many tractors which have been wearing off the new and which have been acclimatizing themselves, at it were, during the last season or two. In superficial appearance, perhaps, the models of these machines which will be seen at Kansas City will show few if any notable changes, but in detail some of them have been changed extensively, and always for the better. Henceforth, with the changes embodied, these models will take their proper places among the tried and the true.

No Startling Designs

A third classification might be made of those tractors which are not exactly new, because they have been seen at other shows and at demonstrations, but which will be new at Kansas City. To a majority of the dealers who will attend the show these machines, no matter how familiar they may be to the engineering branches of the trade, will present all the attraction of novelty.

Lastly, there will be the real, simon-pure, new things. These will be numerous, too. Interest will center on them, not because of any marked differences they will present to principles of design which may be said to be practically standardized, but because of their conformity to established design.

For there will be nothing at Kansas City which will startle because of its peculiarity nor because it just is different. It may be expected that the display, both of old and new, will indicate that tractor designers have pretty well settled on what shall be conventional standards and that the present tendency is toward conformity to these standards rather than toward the strange and the unusual. Specialization there will continue to be, yes, but not freakish diversity of type. The day of the freak tractor has gone.

Stinson Greatly Changed

No attempt will be made here to go into elaborate detail about either the improvements to be found on the old models nor the things to be associated with the new. A mere mention will be made of some of the machines to look to for both. With them all on the floor at Kansas City, where they may be observed and compared, the sophisticated tractor man will have no difficulty in locating the improvements and intelligently estimating them.

The Stinson, for instance, shown at Minneapolis last year in 3-wheel type and gas-pipe and adjustable frame, will appear at Kansas City this year with the conventional four wheels and with almost a complete set of new specifications. During the year the Stinson has seen fit to conform to the preference for the 4-wheel tread over the 3-wheel type.

The 12-22 and the 16-30 Eagles, shown at Minneapolis last week, will make their initial bow to the Southwest trade at Kansas City next week. While neither of these models is actually new to the industry they will be new to the visitors to the National show.

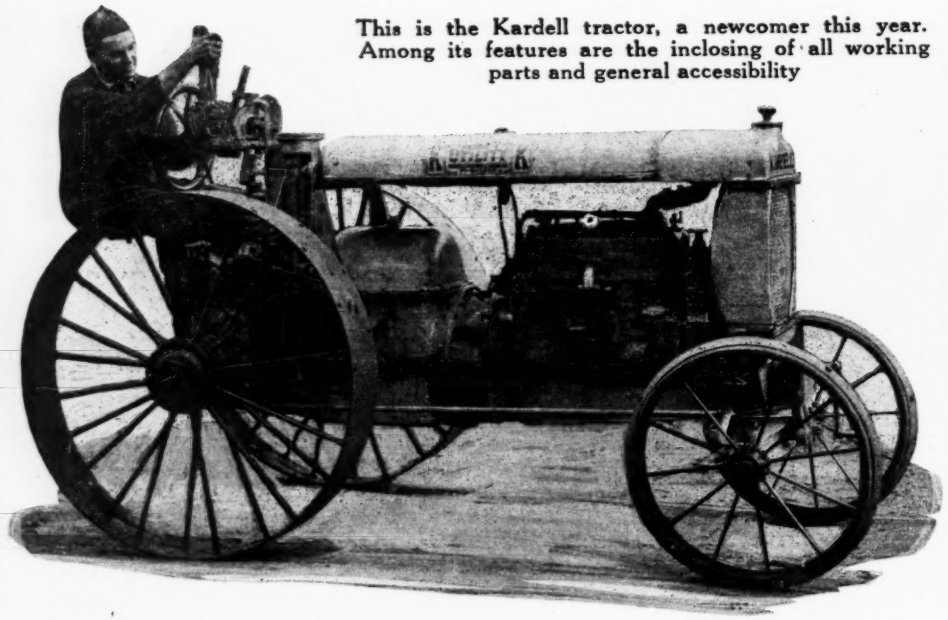
Kardell a Newcomer

A new tractor at both the Minneapolis show last week and at Kansas City next week is the Kardell Utility. This model has been developed during the last year. The company now is in production and intends to be a live factor in the trade.

A tractor of the track laying type which has been perfected and brought into production during the last year and which will be introduced to the trade at Kansas City next week is the J. T.

While Leader tractors have been a recognized factor in the trade for several years yet the company comes onto the market this year with a new model which will be known as the Leader N 16-32. The specifications indicate that a number of important changes have been made over previous models.

Visitors to the Lauson booth at Kansas City will have their attention attracted to the specialized Road model which the company will exhibit. This model has a larger engine than has the Full Jeweled model and has other modifications which adapt it specifically for the heavy duty of road construction work.



This is the Kardell tractor, a newcomer this year. Among its features are the inclosing of all working parts and general accessibility

An improved model of the Wisconsin 16-30, to which the company will devote its production henceforth, will present several acceptable improvements in design, notable among which are the inclosed gears and a modified final drive. The improvements which have been incorporated in the 1920 Wisconsin are the result of practical experience and are along the lines which tractor engineers approve.

Among the new models which will be seen at Kansas City is the model D 15-30 Shelby. This shows a number of changes from the model brought out last year in addition to being larger and more powerful in every way.

Larger Engine in Port Huron

A larger engine and an improved force feed oiling system, together with a liquid air-washer, will distinguish the Port Huron 12-25 model from the previous tractors brought out by the company. The 1920 model has a 4¾ by 6 in. oversize engine, giving a greater reserve power.

Among the new models which will be seen at Kansas City, but for which neither illustrations nor specifications were obtainable at the time of writing, will be the new Blue J tractor—Model IV,—a new Kansas City Hay Press Co. model, to be known as Model D, and a new agricultural model which will be put on the market this year by the Bullock Tractor Co.

Coleman Has Greater Drawbar Pull

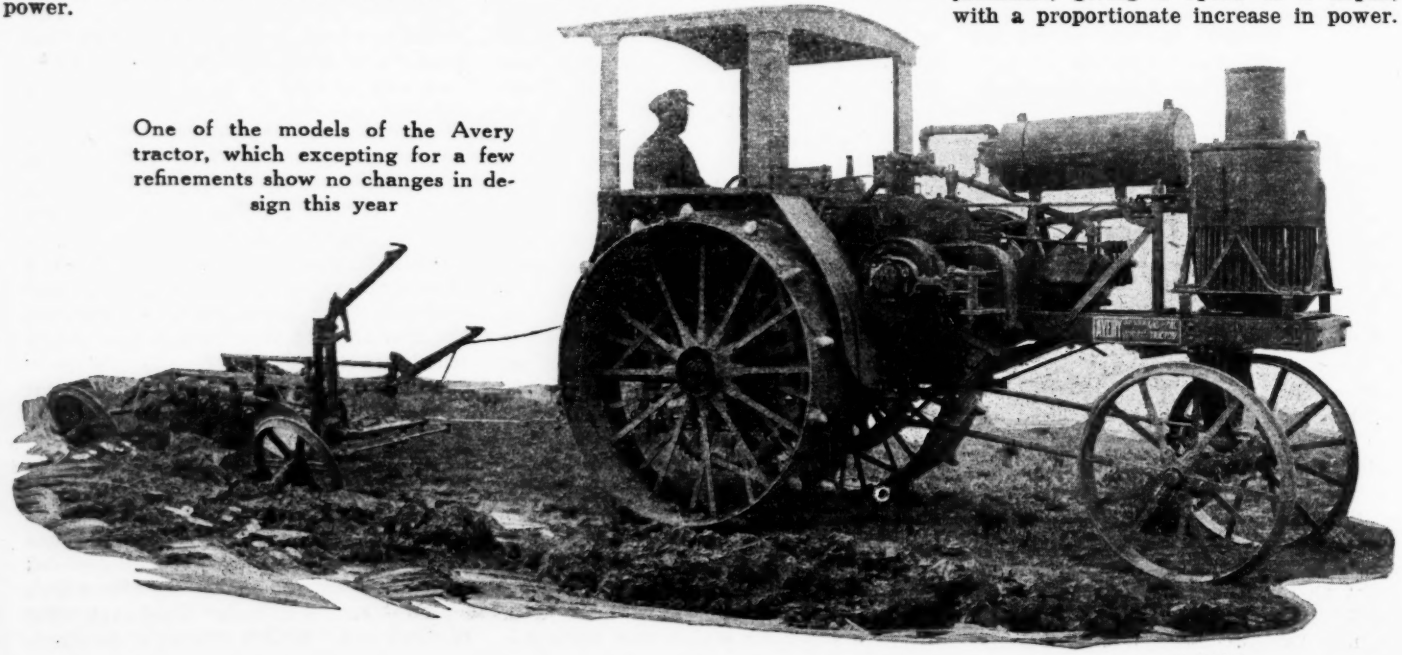
The Coleman Tractor Corp. will introduce Model B, which differs in some important particulars from the 1919 machines. For instance, an emergency low speed has been provided which gives a constant drawbar pull of 3800 lbs. This is to be resorted to only in cases of excessively difficult plowing conditions. Another feature is in the power take off. The belt transmission consists of two steel mitre gears so arranged that they are idle when the tractor is being used on the drawbar. When power on the belt is wanted the pulley shaft is pushed into gear and locked. This arrangement permits the pulley to set well in front of the rear wheel. Also the Coleman has discarded red paint for a battle-ship grey.

The old model of the Cletrac, which has been known to the trade as the Model H, has been discarded and replaced by Model W. While the new model is identically the same as the old in most respects there are a number of important changes.

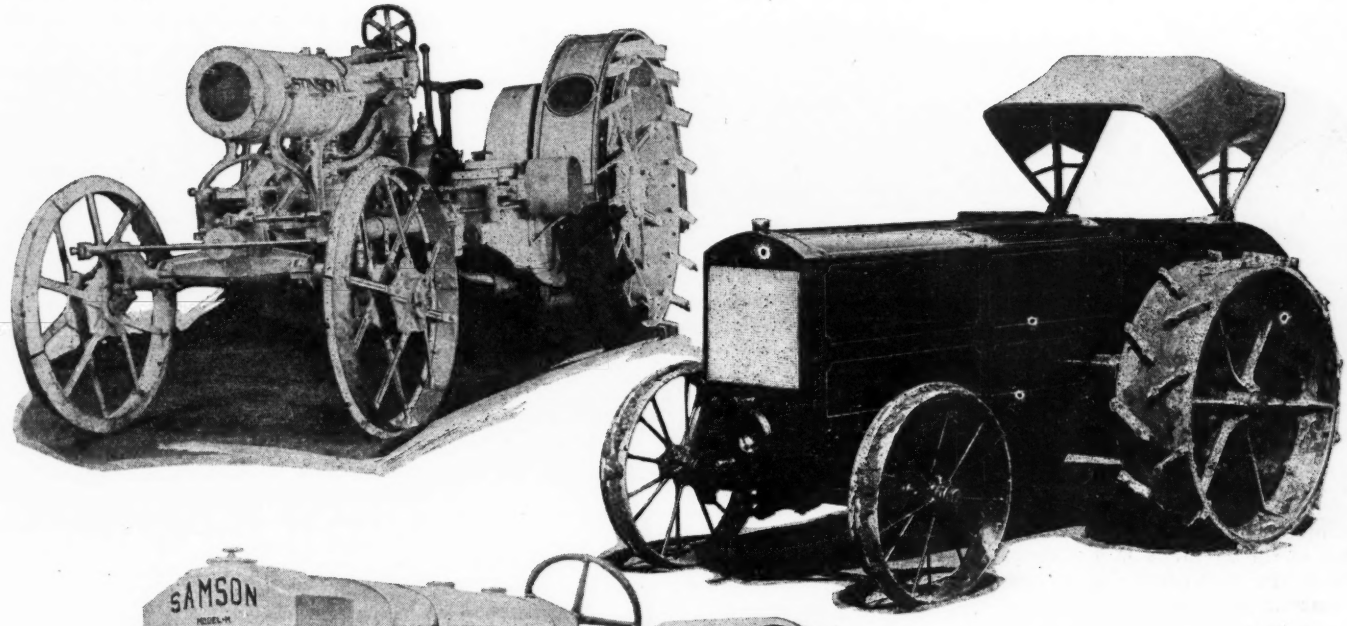
Air-Washer on Cletrac

The new model will be painted a dark grey. The size of the engine has been increased from 3⅜ in. bore to 4 in. bore, the stroke remaining the same. The track supporting roller has been eliminated and the dust shield has been redesigned to afford the lower track wheels better protection from dust and mud. The company's water air-cleaner has been added as standard equipment. The seat has been redesigned with the idea of making it more comfortable and there are some changes in the footboard and the steering wheel. Some changes have been made in the transmission and the new model is using large size ball bearings on the pinion end of the drive shaft. Improvements also have been made looking to the dustproofing of the lower track and rear sprocket.

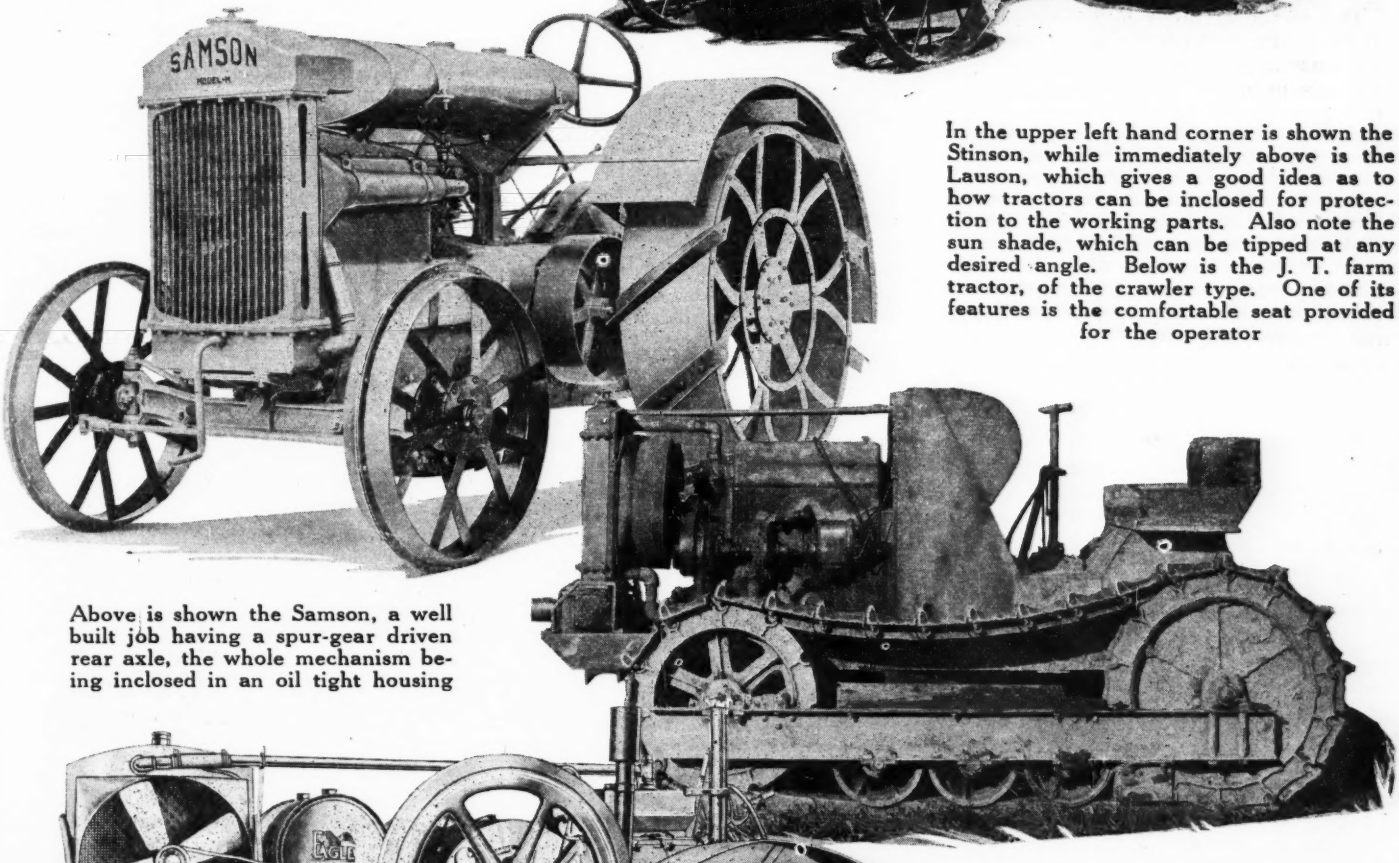
The Short Turn Tractor Co. has increased the hp. of its engine from 30 to 42 in the model which will be shown at Kansas City. This, in connection with the three speeds on the pulley which this tractor has, is a distinct feature. The Short Turn is driven direct from the clutch, which is inclosed in the flywheel, through a spline gear, which, when connected with the pinion at the extreme end of the jackshaft, will give a forward speed of 3 m.p.h. By sliding this same pinion back within the internal gear on the inside of the transmission pulley, a reverse is obtained. Thus a 2 in. move will connect the smaller pinion of the spur gear to the larger pinion on the jackshaft, giving a speed of 2 m.p.h., with a proportionate increase in power.



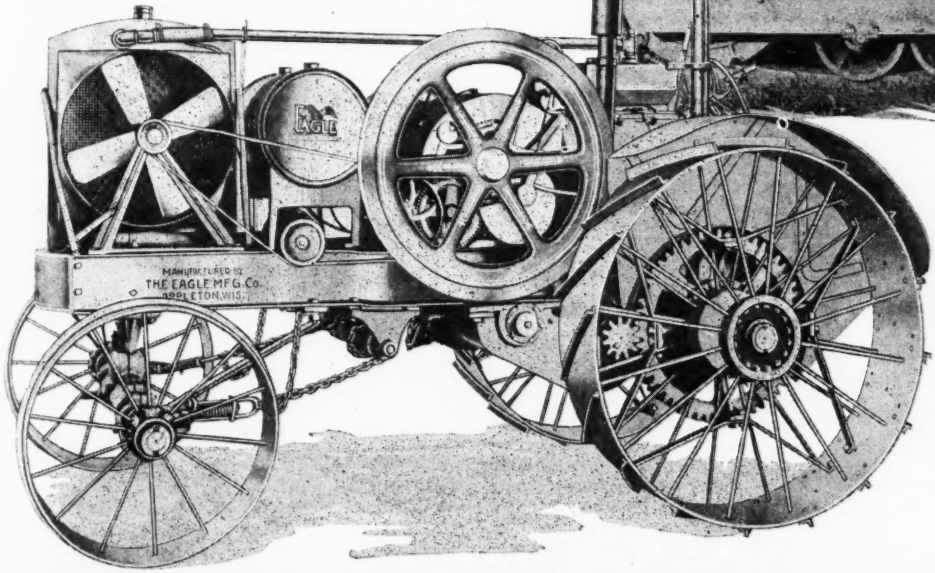
One of the models of the Avery tractor, which excepting for a few refinements show no changes in design this year



In the upper left hand corner is shown the Stinson, while immediately above is the Lauson, which gives a good idea as to how tractors can be inclosed for protection to the working parts. Also note the sun shade, which can be tipped at any desired angle. Below is the J. T. farm tractor, of the crawler type. One of its features is the comfortable seat provided for the operator



Above is shown the Samson, a well built job having a spur-gear driven rear axle, the whole mechanism being inclosed in an oil tight housing

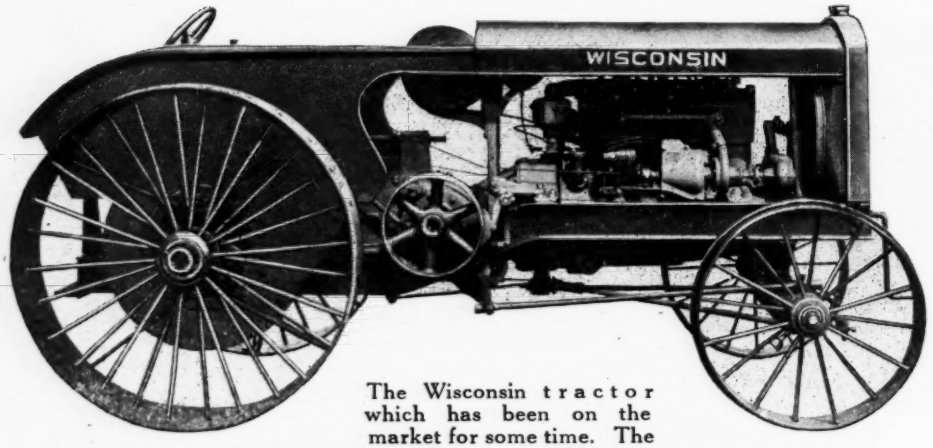


The Eagle tractor which hails from Appleton, Wis. One of the features claimed for this tractor is its accessibility. It is of the type using open gearing and horizontal engine

By sliding the pinion out of the internal gear at the engine end of the jackshaft the entire transmission is released from the driving mechanism of the tractor, the outside of the transmission being used as a belt pulley. This gives the pulley three speeds. Visitors will be interested in this ingenious arrangement.

In the old lines there will be some new models. The new Avery 14-28 will fill a gap in the Avery standardized line and a 22-40 has been added to the Case line. There are some changes too in the Allis-Chalmers 18-30 which almost merit calling it a new model.

Many of the machines which have been continuously on the market for the last two or three years will show refinements and improvements too numerous



The Wisconsin tractor which has been on the market for some time. The engine layout permits of easy inspection on parts like magneto, water pumps, etc.

to mention here, but all of which will be part of the attractions at Kansas City.

One of the features of the Kansas City show which will attract great attention, not only because of its inherent interest but also because it demonstrates one of the lines upon which tractor development is progressing, will be the display of small machines.

These small tractors are of three classes: the garden variety, the motor cultivator tractor and the general purpose tractor.

The garden tractor which is making the most noise in the world right now is the Utilitor, on which an aggressive sales campaign is being waged and which is becoming established. The Midwest Engine Co. plans to have a very complete display at Kansas City.

Among the motor cultivator type tractors there will be the two models of the Avery, the two of the Toro, the Samson Iron Horse, the Rock Island motor cultivator and the Bailor at least. Later entries may include some more of these small machines in the list.

A new model of the Allis-Chalmers general purpose will be on exhibition and also there will be .the Indiana Whether the Shaw-Enochs machine will be there has not been determined as yet.

All of these specialized tractors have great interest for the dealer as the present indications are that there will be a tremendous development of trade along machines of these types during the next year or two. In fact, it is thought likely that these small motorized pieces of farm equipment will go farther toward taking the horse off the farm than will the big machines.

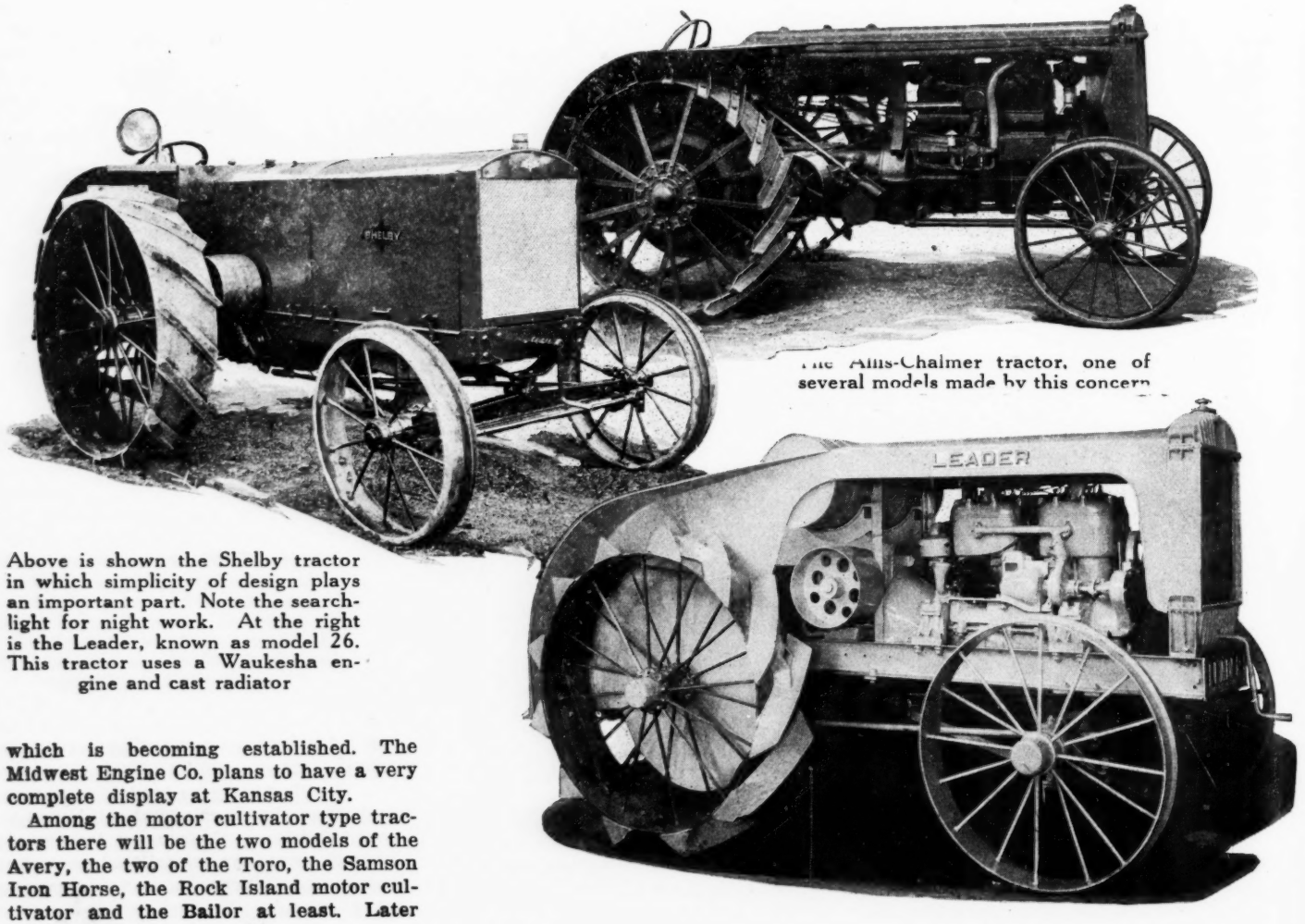
There are a number of new machines which never have been shown before at Among the former are the Cata-Gripper, the American Standard, the Shawnee, the Kardell, the Magnet and the Klumb. And among the latter are the Samson Iron Horse, the Model M La Crosse, the Vim, the new 6-cylinder Avery, the 11-28 Avery and the 22-40 Case.

American Standard Has New Gearset

The distinctive feature of the American Standard is a new and simplified form of transmission. It is claimed by the inventors of this new gearset that more of the power of the engine is delivered at the drawbar than can be delivered by any other type of transmission. It is very simple, consisting of only five gears, one roller chain, two sprockets and four bearings, all running in a bath o foil in a dust-tight gearcase.

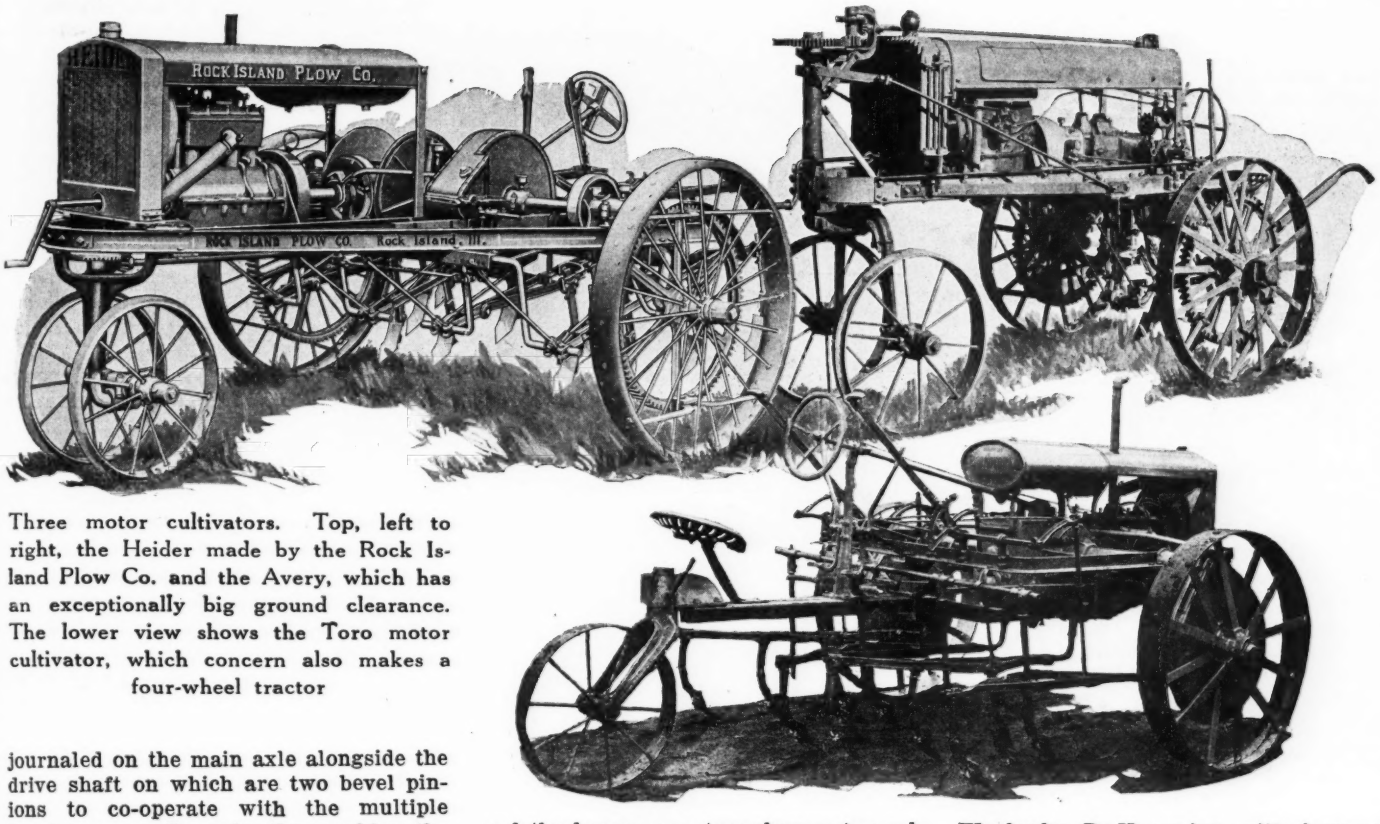
The engine in the American Standard is a 4 by 6 in. Erd with 950 r.p.m. It is claimed that with this engine it is possible to deliver more than 2850 lbs. at the drawbar and to pull four 14-in. bottoms. The whole tractor weighs but 3,750 lbs.

Briefly, in the American Standard gearset, the drive shaft, in alignment with the crankshaft of the engine, is run by a patented device through the main or rear axle and is therefore parallel with the horizontal diameter of the drive wheels. Thus for two speeds forward, only a multiple beveled gear need be



The Allis-Chalmer tractor, one of several models made by this concern

Above is shown the Shelby tractor in which simplicity of design plays an important part. Note the searchlight for night work. At the right is the Leader, known as model 26. This tractor uses a Waukesha engine and cast radiator



Three motor cultivators. Top, left to right, the Heider made by the Rock Island Plow Co. and the Avery, which has an exceptionally big ground clearance. The lower view shows the Toro motor cultivator, which concern also makes a four-wheel tractor

journaled on the main axle alongside the drive shaft on which are two bevel pinions to co-operate with the multiple bevel gear on the axle, thus making the rear axle part of the transmission. This puts the weight of the transmission on the rear axle and drive wheels and by running the drive shaft through the rear axle only one-half of the gear set extends above the center line of the axle. There are only two control levers, one for engaging the clutch and converting it from a contracting band to a jaw clutch drive, the other for changing gears. The extreme simplicity of the gearset and the possible reduction of service trouble are features which the inventors emphasize.

The American Standard also has a patented self-adjusting spring cushioned drawbar and a spring mounted self-adjusting and self-leveling front axle.

It was not the original purpose of the company to build a tractor. Rather it was hoped to interest some present tractor company in the patented features embodied in the model which finally was built and which is on display here.

Shawnee A Newcomer

The Shawnee, built by the Shaw-Enochs Tractor Co., Minneapolis, is of the general purpose type and is made in two sizes, a 6-12 and a 9-18. The former weighs 2600 lbs., has a four-cylinder LeRoi, 3⅛ by 4½ in. engine, with LeRoi governor and 8 in. Borg & Beck clutch. The latter weighs 3000 lbs., has a four-cylinder Gray, 3½ by 5 in. engine, with Duplex governor and 10 in. Borg & Beck clutch. The smaller machine will be known as a one-plow motor cultivator and the larger as a two-plow motor cultivator.

A special feature of the Shawnee is the double worm final drive, one for each drive wheel.

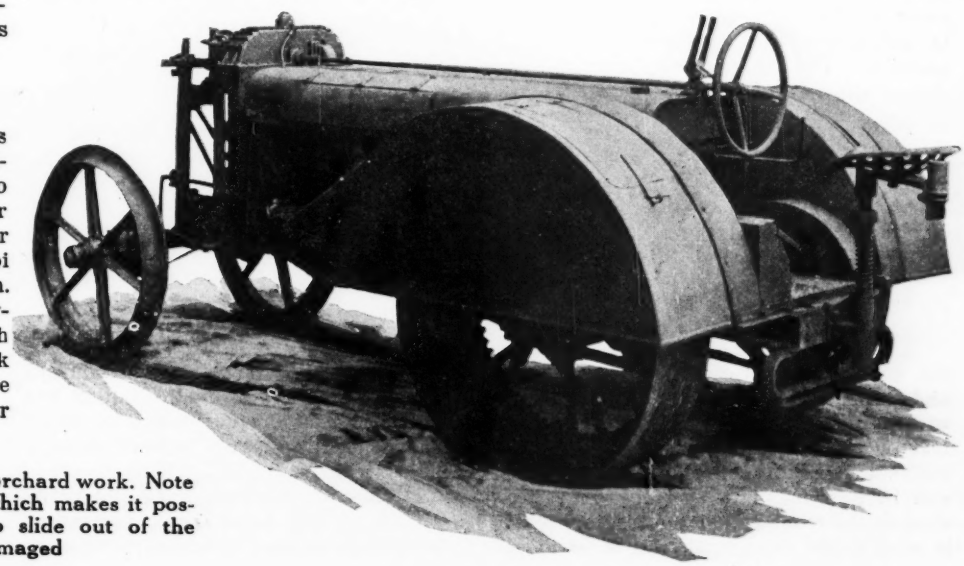
The Klumb tractor, made by the Liberty Tractor Co., Dubuque, Ia., is a compromise between the three and the four wheel types. The front wheels of the Klumb are set close together, the frame of the tractor, goosenecking from the engine base, angles to a narrow cross section at the front which provides a support for the steering yoke which forks and engages the front axle.

The Klumb has a four-cylinder Climax, 5 by 6½ in. engine and develops 30 hp. at 800 r.p.m. It will be known as the Model F and will be rated at 16-32. It weighs 5000 lbs.

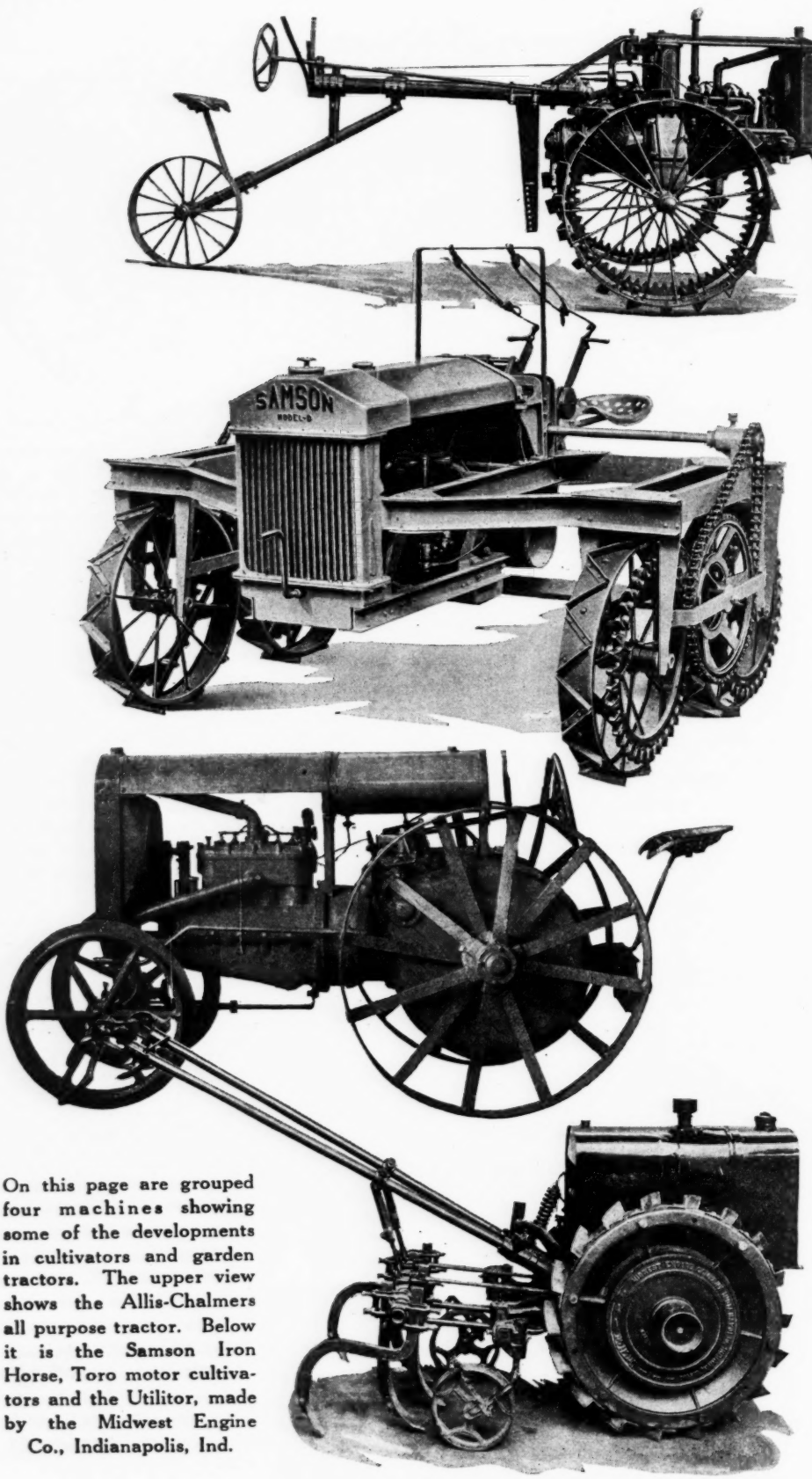
The Magnet is a worm drive, four wheel type tractor, with four-cylinder Waukesha D U engine with bore and stroke of 4½ by 6½ and 900 r.p.m. It weighs 4400 lbs. and rates at 14-28. The Magnet is of three unit construction, consisting of power plant with clutch, enclosed; transmission gear and power take off, enclosed; rear axle and worm, also completely enclosed.

The Cata-Gripper is a new track laying type of tractor manufactured by the Inland American Tractor Co., Eau Claire, Wis. The illustration shows the genereal appearance and conventional type design embodied in this new machine.

The "Cata-Gripper" basically does not differ from other machines of this type. Every moving part runs in oil and all working parts are enclosed in an oil tight, dust proof case, which the makers claim make it a long-lived job. There are two main controlling levers within easy reach of the operator for guiding



This is the Avery tractor used for orchard work. Note the peculiar shape of the fenders which makes it possible for low hanging branches to slide out of the way without being damaged



On this page are grouped four machines showing some of the developments in cultivators and garden tractors. The upper view shows the Allis-Chalmers all purpose tractor. Below it is the Samson Iron Horse, Toro motor cultivators and the Utilitor, made by the Midwest Engine Co., Indianapolis, Ind.

the tractor while the transmission lever and spark and throttle controls also are within easy reach. A feature of this tractor is the arrangement of the pulley which instead of being mounted on the end of a crankshaft is mounted crosswise at the front end of the tractor. This is said to do away with the objectional features encountered from the conventional method of placing the pulley and the tractor has the advantage of being able to back up or run forward to vary the belt tension.

The Plowman tractor makes its reappearance at the show here, indicating that the reorganized company at Waterloo is getting into production and is planning to be a factor in the tractor trade again.

One novelty in this department is the Ronning automotive ensilage harvester. This self contained machine is made by the American Harvester Co., Minneapolis, and is a combined corn harvester and ensilage cutter. It cuts and shreds the corn and delivers the ensilage ready for the silo into a wagon drawn alongside. At the silo the ensilage is dumped into a hopper and is blown into the silo in the regular way by a stationary blower stationed at the silo.

The display of power operative equipment is not as large and extensive as one might expect, nevertheless it is typical of the kind of equipment used most extensively in this section of the country. There is a good showing of grain separators, plows, disks, silo machinery and feed grinders.

In short, the whole tractor display is standing evidence of the condition of stability into which the tractor business is getting as respects design and construction. In other words, engineers are not relying so much upon theory and more upon practical experience. There are so many tractors in the field now that engineers are learning just what they must do to refine and perfect the models they already have, and tractor development may be expected to progress along such lines for the future instead of along the lines of new design.

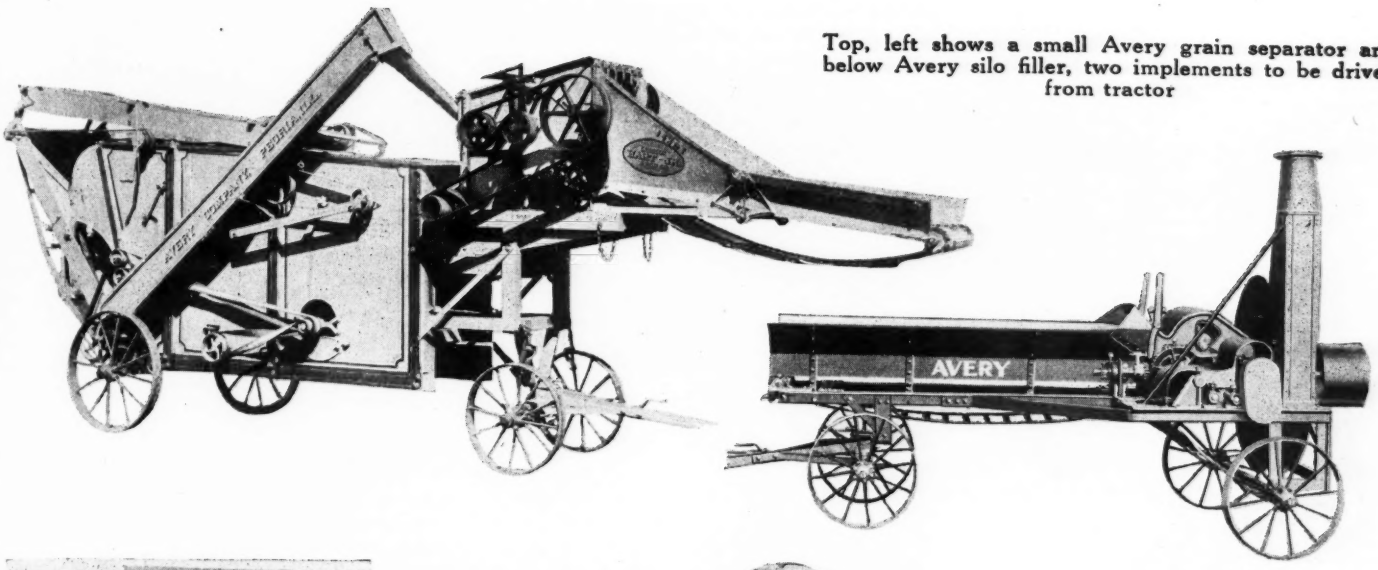
Post Is a New Model

The Post tractor is an unusual model and does not follow the accepted lines of tractor design. During 1918 this company made a few tractors of Model "B," and during 1919 quite a number of the Model "C," which were tried out under various conditions in Ohio and Kentucky. These tests have shown that the tractor is suited to farm work, and also that the Model "C" was not sufficiently powerful for the range of conditions which are met with in the ordinary course of work. They are now bringing out their Model "D" tractor which has a great deal more power than the Model "C" and full information of it will be available in about six weeks.

This machine drives in the furrow; can turn in a radius of 6 ft.; pulls 2 or 3 14-in. plows; is good for all the ordinary power work; is equipped with power steer which enables the operator to give the driving the minimum of attention. There are also other features which render it exceptionally serviceable in sidehill plowing.

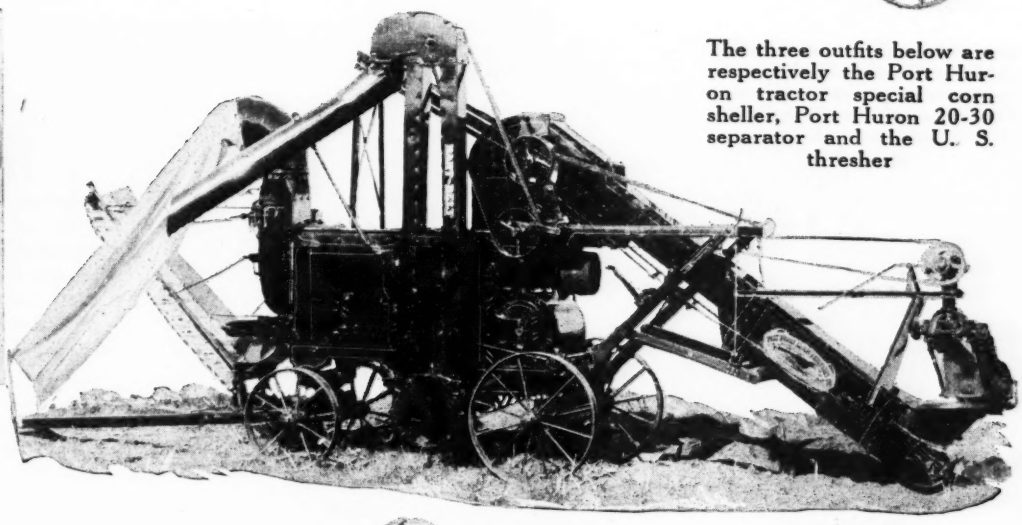
MARMON PRICES ARE RAISED

Indianapolis, Feb. 6—The Nordyke & Marmon Co. has announced a price advance effective Feb. 2 on both open and closed cars and chassis of $350 over prices previously in force. This puts the Marmon 34 seven- and four-passenger touring cars and the four-passenger roadster at $5000 each f.o.b. Indianapolis. The coupe is $6,100; the Sedan $6,600; the limousine and town cars each $6,800.

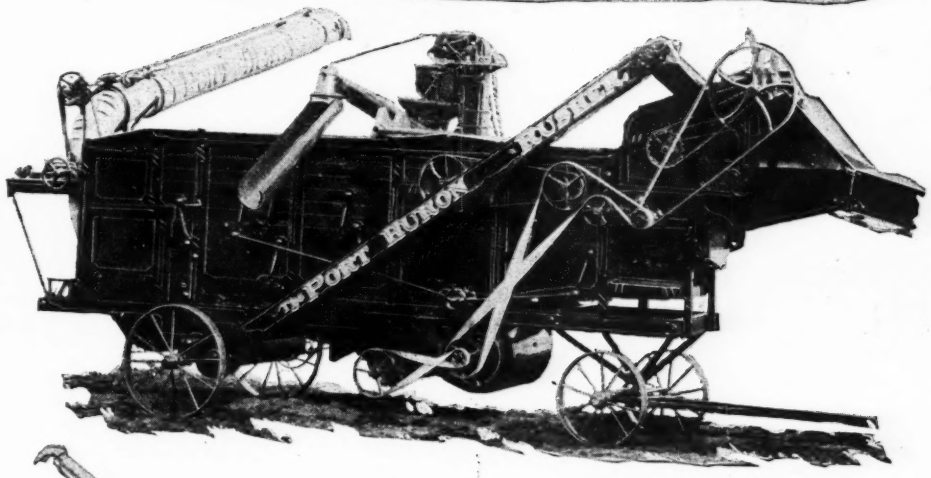


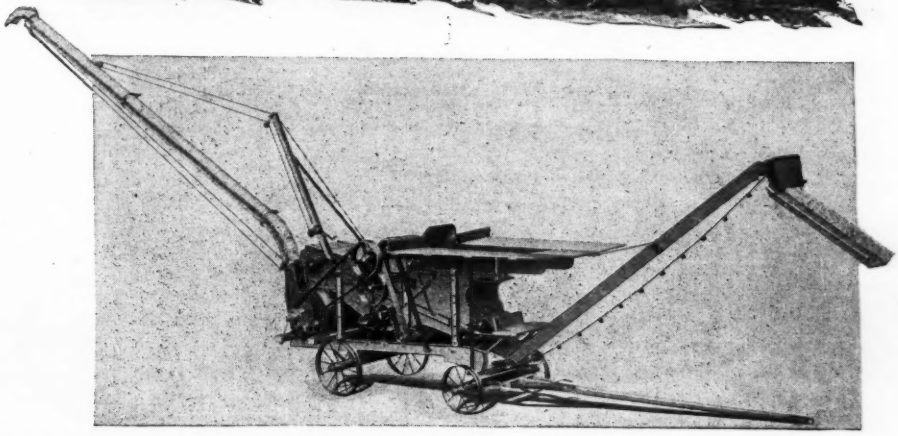
Top, left shows a small Avery grain separator and below Avery silo filler, two implements to be driven from tractor

The Challenge crusher and grinder, illustrating a type of machine of which there are many on the market



The three outfits below are respectively the Port Huron tractor special corn sheller, Port Huron 20-30 separator and the U. S. thresher



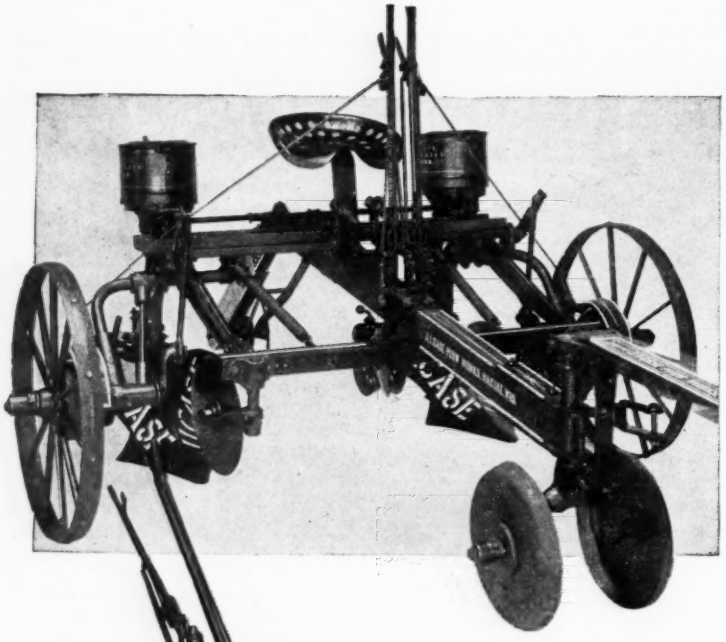


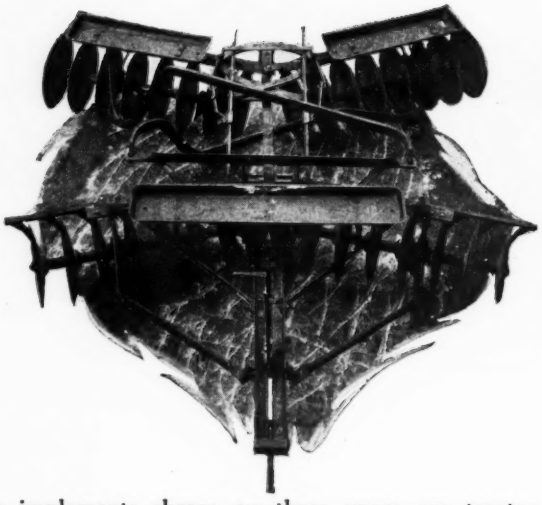
Tractor Drawn and Driven Machinery

What the Dealer Should Know About the Great Industry Centered Around the Tractor

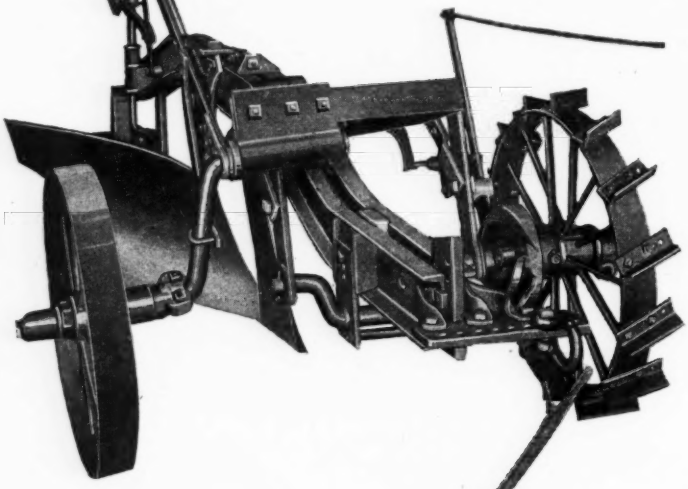
THE tractor dealer who expects to go strong into the field of power farming must know a great deal more than merely tractors and gasoline engines.

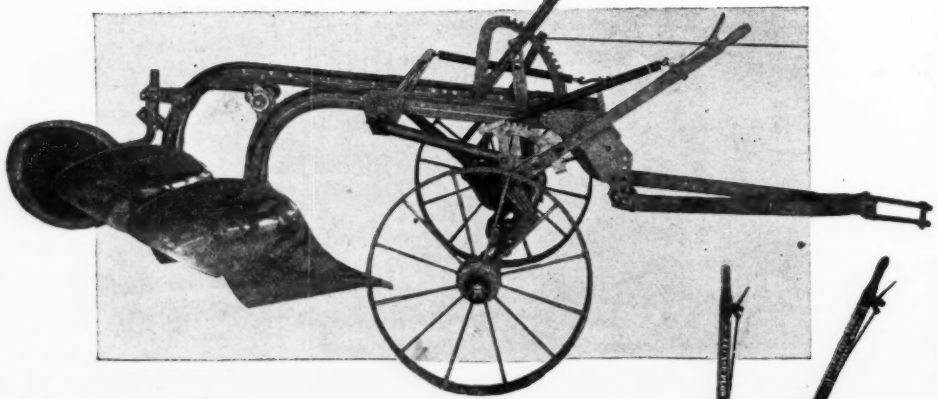
He must be aware that a great industry is growing up around the tractor itself, in the way of tractor drawn and driven machinery. Furthermore he must fortify himself with the necessary information about all this equipment, so he intelligently can tell his customers what sort of equipment will go with whatever tractor he is selling.

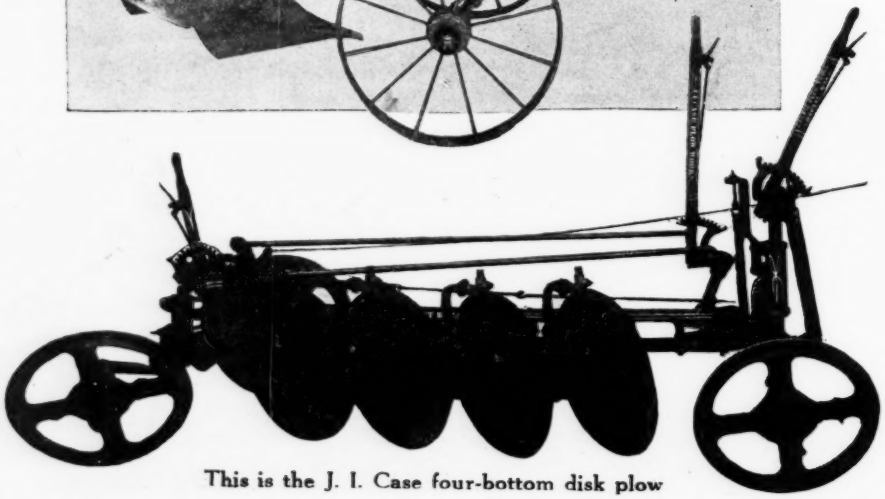




The implements shown on these pages are tractor drawn. Top, left, shows Case power lister and right, Vulcan disk harrow. In the center are shown the LaCrosse grubbing plow and the two-bottom special light LaCrosse water plow







This is the J. I. Case four-bottom disk plow

He must be able to tell a silo filler from a corn thresher, a moldboard plow from a disk plow. He need not necessarily stock implements, but he should certainly know about them. Selling and servicing a tractor is but one phase of power farming. A good knowledge of soil characteristics, crops raised, plowing conditions, potential use of certain implements, etc., are bound to broaden the dealer's business.

In order to give some idea of the kind of machinery being made to-day to be operated with tractors we are showing on these pages illustrations of threshers, feed grinders, listers, plows, disk harrows, etc.

Machinery such as herewith shown has and is making it possible to raise better crops in many parts of the country. Animal power and horse-drawn implements are limited. You can plow only so deep. And horses get tired. The tractor makes its possible to get down to and break up what is commonly called "plow sole." The tractor can work day in and day out without halt and with the work running uniform.

Farm Machinery Being Refined

Just as the tractor is being refined, so are tractor-drawn and driven machines being refined. A few years ago roller bearings and ball bearings were unheard of in farm machinery. But the higher speeds of the internal combustion engine and the greater pulling power of a tractor over horses has caused considerable revision in the layout of farm machinery.

The implement makers soon saw that their products were entirely lacking when it came to hitching them up to tractors. Plain bearings with clearances anywhere from $\frac{1}{16}$ to $\frac{1}{8}$ in. had to give way to anti-friction bearings, fitted to several thousandths of an inch. Not only this but the bearings are being inclosed for protection from grit and sand, just

as tractor bearings are being inclosed. As the tractor becomes refined, so must the implements be refined.

Take the case of a certain make of popular plow. Much trouble was encountered by the bearing in the coulter wearing out in a short time. After several trials with different forms of bearings the makers put in a roller bearing, inclosed it and to-day the job stands up very well in service.

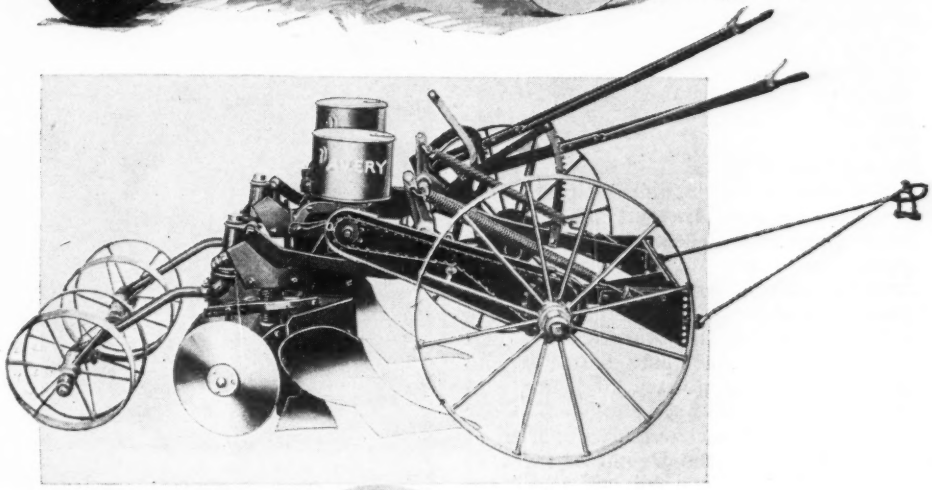
Of course most of the development and perfecting of power-farming equipment has been in the tractor-drawn implements. Threshers, feed grinders, ensilage cutters, silo fillers, etc., which come in the line of power driven machines are pretty much the same as those of years ago, because it makes little difference whether the power comes from a stationary gasoline engine, tractor or steam engine.

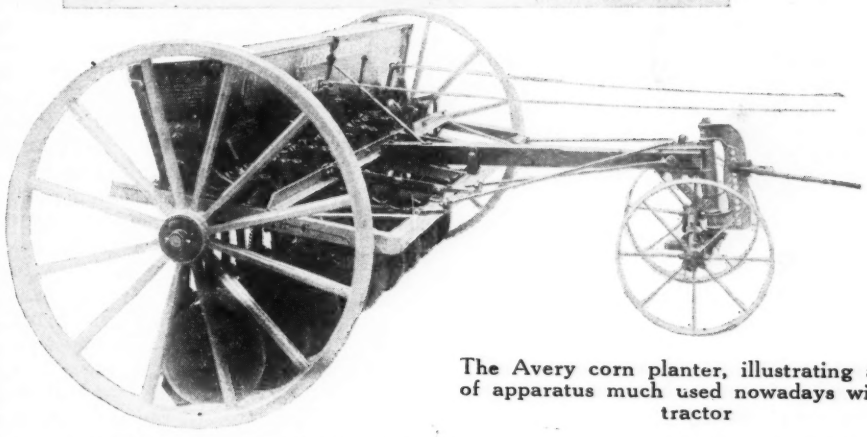
It is not a difficult matter to see why tractor-drawn implements must be built more rugged than the horse-drawn types. The very fact that tractors make it possible to plow deeper, necessarily subjects the plow mechanism to more severe stresses, not only in the moving parts, but in the fixed members. That is why we see better steels used and better bearing layouts where abnormal wear is likely to occur.

The implement is after all the business end of the combination and no matter how good the tractor, poor results only will follow if the implement cannot stand the gaff. It readily will be seen, therefore, that where we have horses we must have horse-drawn implements and where we have tractors we must have tractor-drawn implements. The two are vastly different.

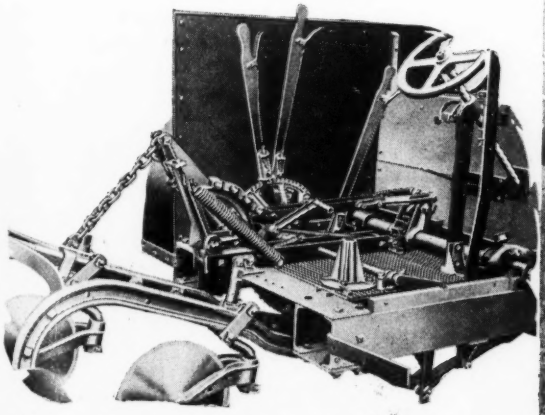
The dealer will do well to look over the machinery on these pages and see how little or how much he knows about it. He need not know whether vanadium steel is used for a certain part or not, but he ought to know whether this machine is suitable for Joe Bush's farm or not. The clerk who sells you a silk necktie doesn't know a lot about silk worms, but he probably can tell you why you should buy a certain tie. The same thought applies to farm machinery.

The two implements shown below are the Grand Detour tandem disk water-harrow and the Avery power lister

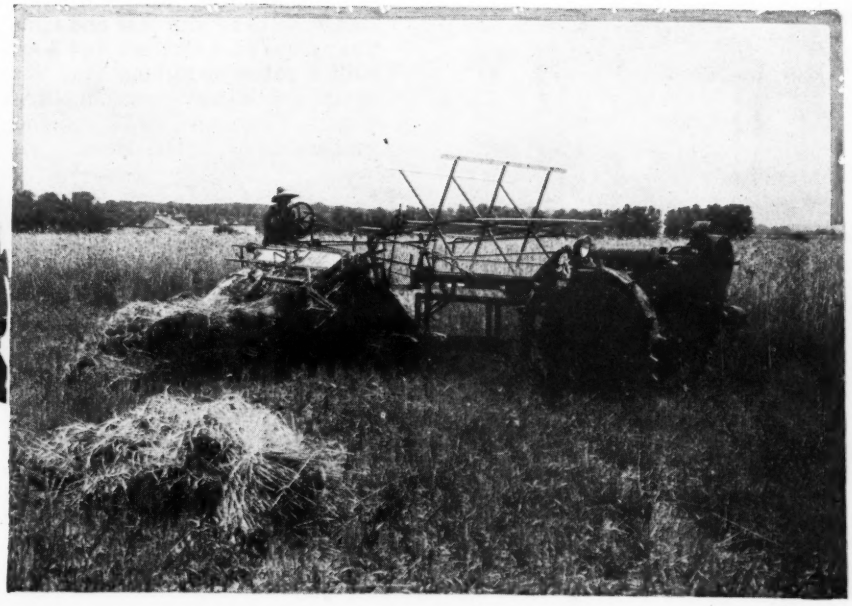




The Avery corn planter, illustrating a type of apparatus much used nowadays with the tractor



Above, power lift mechanism of the No. 59 Rock Island gang plow. Right, a Moline Universal pulling a grain binder, the latter taking a 10 ft. cut



Fitments for the Tractor

Some of the Latest Devices Brought Out Giving Increased Comfort and Utility to the Tractor

Goodrich Hitch

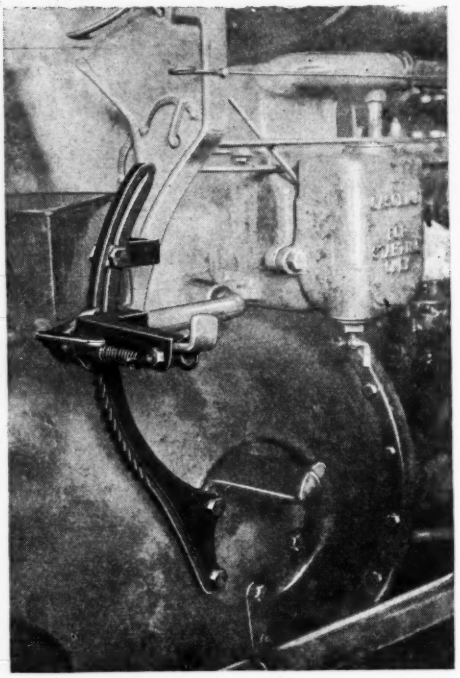
This hitch was designed primarily to provide a means for reducing the angle when making a turn with an implement coupled to a farm tractor, decreasing the movements of the tractor and a saving in time when engaged in orchard and similar work.

Specifications at present call for a design of a size for mounting upon a Fordson, but with slight changes in measurements the hitch may be made up for use on any tractor of the four wheeled type.

The construction of the Goodrich hitch consists of a steel drawbar attached to a stud suspended below the gear case about the center of the tractor. The drawbar extends to the rear and beyond the rear wheels and at a point behind the rear axle slides horizontally in a slot formed by two steel bars bolted to and hung from the stationary hitch bar with which most tractors are equipped. A bar welded to the crossbar and supported at the stud absorbs the weight of the load at the stud. Thus the point of resistance is brought forward and below a point midway between the front and rear axles. This feature entirely eliminates the tendency of the front end of the tractor under load, to "buck" or revolve upward and around the universal. The price is $22 and is made by the Goodrich Co., Chicago.

Crane Wheel Puller

Strictly speaking crane pullers are not tractor accessories any more than they are automobile accessories, but they are nevertheless used in shops for tractor work. They can be used in connection with the repair of all kinds of tractors and readily lend themselves to all kinds of jobs for which no other tools are fitted. With special attachments this tool, besides its usefulness in removing all kinds of rotating parts, can be utilized for bending pipe, straightening shafting, removing universal joint yokes, etc. In combination with an arbor press base attachment an exceeding powerful arbor press is available for forcing in mandrils and armors, assembling ball races and all classes of work ordinarily handled by this kind of tool. One of the features is the fact that the tool is made especially rugged to handle tractor and truck work. They come in both the 2 and 3-arm types with a patented locking arm which prevents the latter from slipping off the work. They are made by the Crane Puller Co., Arlington, Mass.

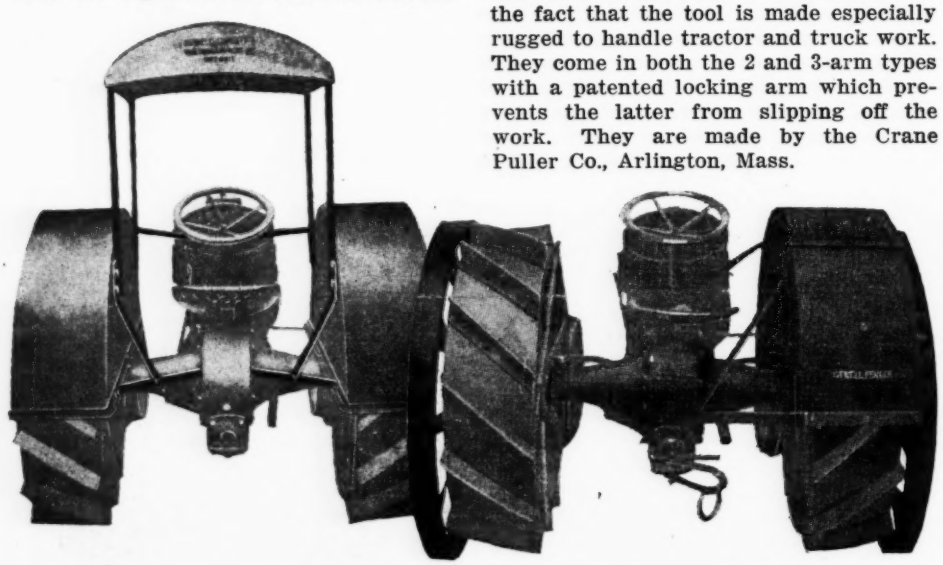


Clutch holder for Fordsons made by the Herring Motor Co., Des Moines, Ia.

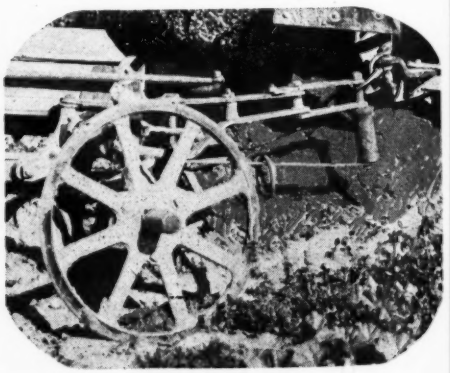
Otwell Road Bands

This is a device to fit the Fordson tractor, and makes it possible for the tractor to do light hauling on hard roads of all kinds and city paving without conflicting with state legislation. When the bands are bolted in place the driving cleats do not touch the paving surface, causing the tractor to roll along as smoothly as a wagon. Under tests the concern has found the road bands will enable the Fordson to pull 1 to 1½ tons on all road conditions and up to as high as 3 tons under favorable conditions. The advantage in not covering the driving cleats with the Otwell road bands is that in case of a mid-hole or soft road the road bands sink in and permit the driving cleats to take hold. The bands can be put on or taken off in 20 min. it is claimed. Twelve bolts are used for fastening them in place. The bands use the same holes in the web of the wheel as are used for the extension rim and also the same bolts and washers. Another feature in using these bands is that the driver is protected from dust, stones, cornstalks, etc., and also the cleats carrying tree limbs in orchard work. The bands are made by the Tractor Equipment Co., Detroit.

Crane wheel puller



Otwell road bands for the Fordson tractor enable them to do light hauling on city paving



Goodrich hitch

Tractor Stop Plow Hitch

Probably the best way of describing the tractor stop plow hitch made by the Meili-Blumberg Co., New Holstein, Wis., is to give the instructions for attaching the hitch to tractor and plow. This is done as follows:

1st. Remove bolt No. 14 and attach casting No. 4.

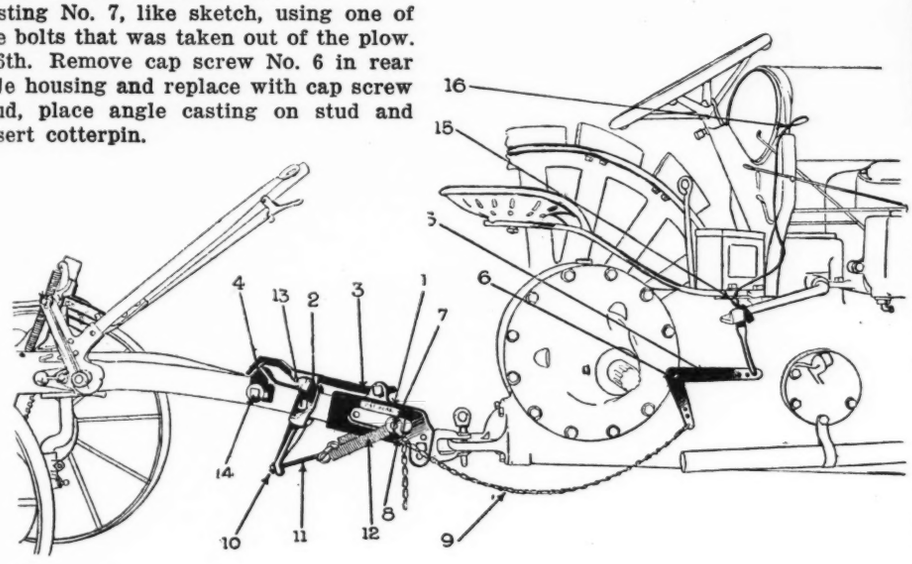
2nd. Remove bolt No. 13 and attach casting No. 2. Do not forget the bushings.

3rd. Remove original wood pin hitch and replace with slide casting No. 1.

4th. Insert steel pin No. 7 which must be driven to fit.

5th. Attach drawbar arm No. 3 to casting No. 7, like sketch, using one of the bolts that was taken out of the plow.

6th. Remove cap screw No. 6 in rear axle housing and replace with cap screw stud, place angle casting on stud and insert cotterpin.



Tractor stop plow hitch

7th. Tie cable to tank strap.

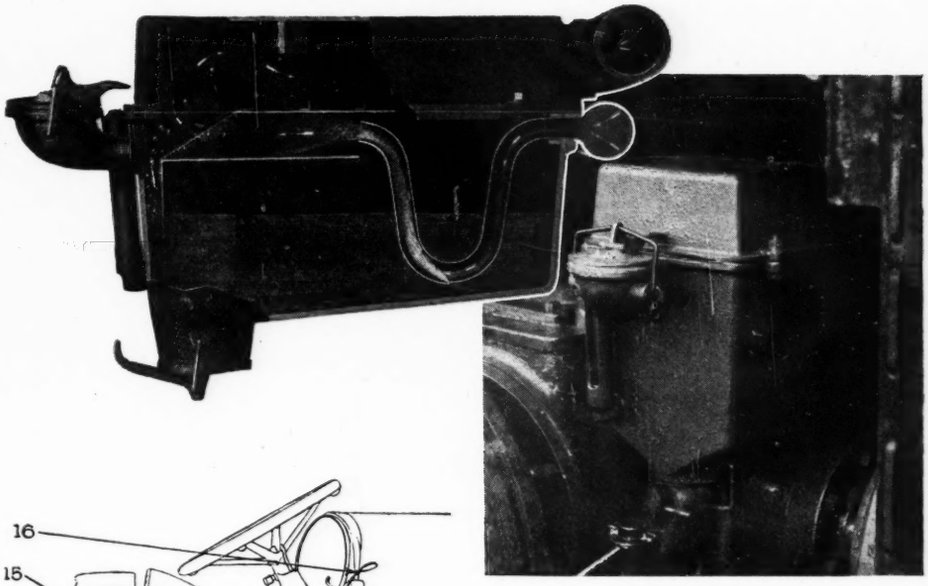
8th. Before attaching tension springs make sure that draw-bar arm No. 3 will lift out of rocker arm No. 2 by pulling on slide casting No. 1. If draw-bar arm No. 3 does not lift out of rocker arm No. 2 move cam No. 4 back until it does. If this does not help bend down draw-bar arm, lifting end No. 3 until pins in draw-bar arm No. 3 lift out of rocker arm No. 2.

9th. Hook springs on pin No. 7, place washers and insert cotterpins, insert adjusting bolt No. 11 and screw on nut No. 10. Do not tighten adjusting springs. Hook chain in hook washer. Do not have chain too short; just short enough to release clutch, to avoid tearing chain.

10th. Set your plow to the proper depth—get plow started—release tension on springs—have tractor pull to unhitch and release your clutch. After you are satisfied that the adjustment is correct tighten tension springs and let the hitch do the rest.

The Cletrac Hitch

The Cletrac hitch shown herewith requires only one adjustment and that adjustment is located on the curve of the drawbar on the hitch as shown by A, B and C. When plowing in heavy soil the brace Y should be connected at hole C. When plowing in medium soil the brace Y should be connected to hold B, and when in light soil to A. No other adjustments are necessary to connect directly to the beam of the plow. In this event, a hole is drilled 7 in. from hole No. 1 to point 2, removing the connecting clevis to hole 2 just drilled and connect the clevis to the beam of the plow. The holes marked 10 in., 12 in. and 14 in. bottoms



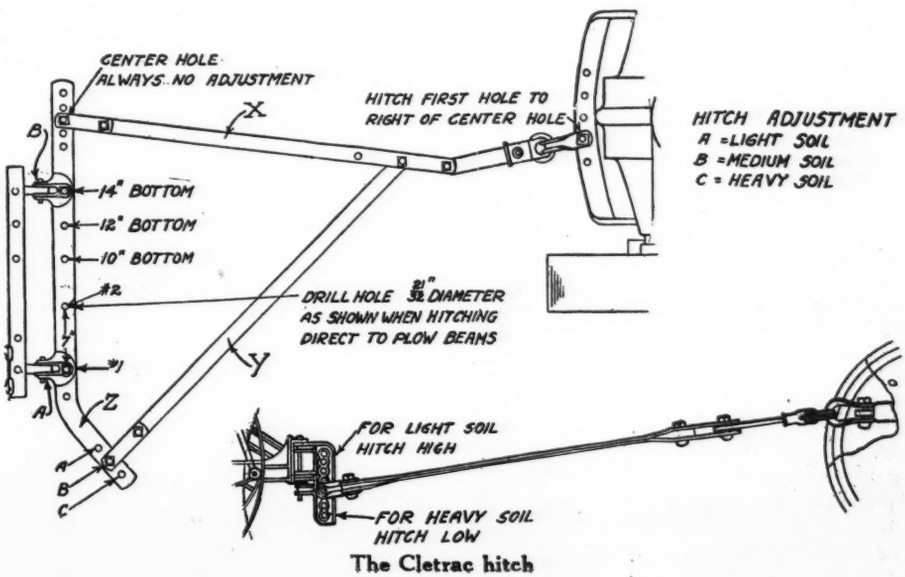
Syphon air-washer

are for the respective sizes of plows. Another view shows the vertical connection of the hitch which is as follows: As the soil increases in weight the hitch should be dropped accordingly, that is, the heavier the soil the lower the hitch, and vice versa.

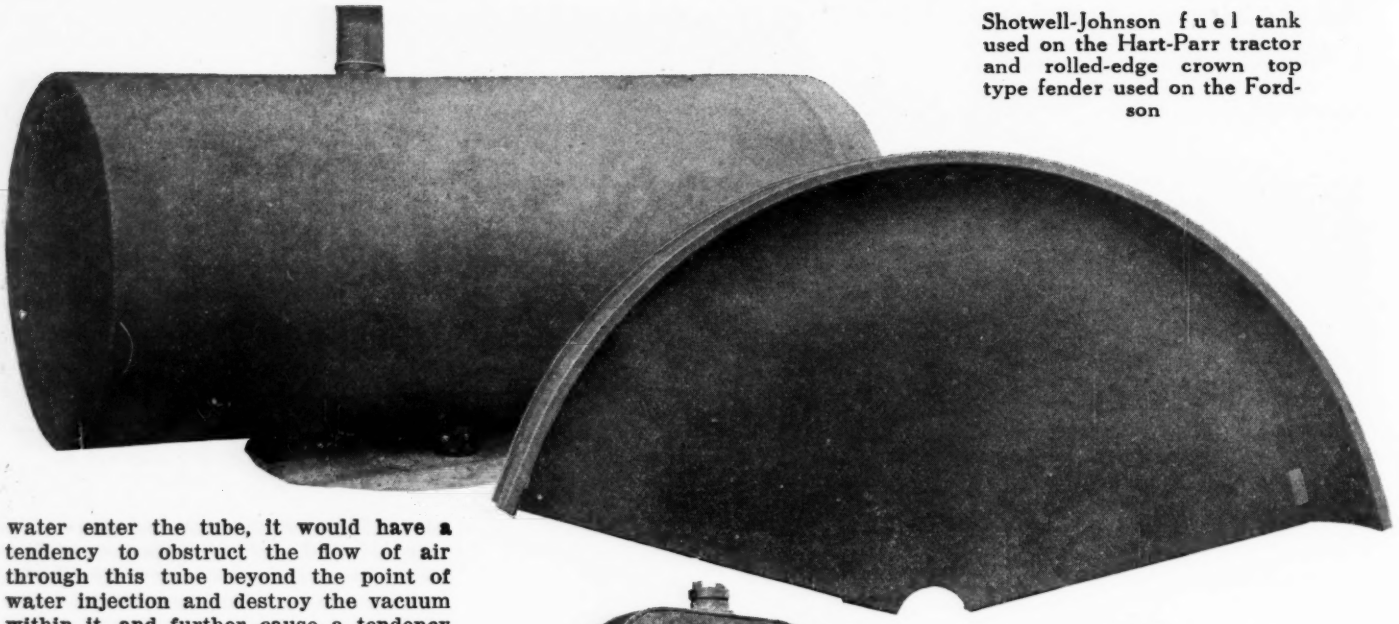
The Syphon Air-Washer

A new type of air washer has been brought out by the Tractor Appliance Co., New Holstein, Wis., and which has been adopted as standard equipment on the Lauson tractor. As will be seen from the illustration, the cleaner has no float or other loosely mounted parts and works upon the principle of injecting a liquid into the air stream, in fact, the action is almost identical to a carbureter.

As the air is drawn through the curved tube, a partial vacuum is created at its lower point, due to the shape of the tube. As this point, water enters and commingles with the air. The tube, being comparatively thin and wide, all of the air current is subjected to the spray of water. Should an excessive amount of


CENTER HOLE ALWAYS NO ADJUSTMENT
HITCH FIRST HOLE TO RIGHT OF CENTER HOLE
HITCH ADJUSTMENT
A = LIGHT SOIL
B = MEDIUM SOIL
C = HEAVY SOIL
14" BOTTOM
12" BOTTOM
10" BOTTOM
#2
#1
DRILL HOLE 21/32" DIAMETER AS SHOWN WHEN HITCHING DIRECT TO PLOW BEAMS
FOR LIGHT SOIL HITCH HIGH
FOR HEAVY SOIL HITCH LOW

The Cletrac hitch



Shotwell-Johnson fuel tank used on the Hart-Parr tractor and rolled-edge crown top type fender used on the Fordson

water enter the tube, it would have a tendency to obstruct the flow of air through this tube beyond the point of water injection and destroy the vacuum within it, and further cause a tendency on the part of the air to pass through the water slot, thus preventing any further water entering until the tube has become unobstructed.

It will therefore be readily understood that the amount of water entering the tube is automatically regulated.

After the mixture of water and air leaves the tube, it is impinged against the plate, forming the partition between the upper and lower chamber of the device, and as the velocity of the air at this point is relatively low, a part of the water drops downward from this plate through the air stream, thus again bringing into contact the air and water.

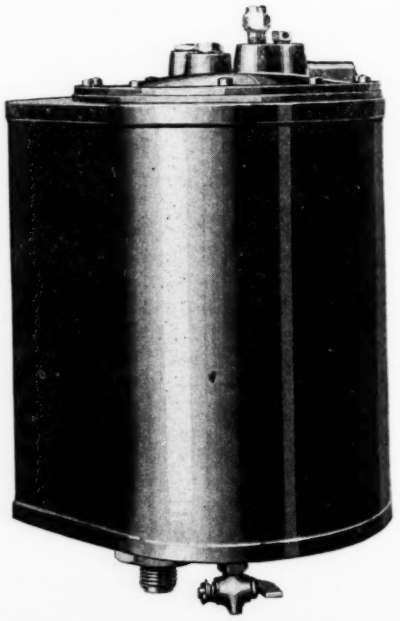
A part of the water coming from the tube will adhere to this plate and travel with the air current and pass over the inclined screen through which the air current passes, thus bringing air and water into contact for the third time.

The air then passes upward to the upper or separating chamber where, by means of a great reduction of velocity, and properly placed baffle plates, all surplus moisture is deposited and the air is allowed to pass to the engine in a dry but highly saturated state. The water, of course, drops back to the lower chamber.

The Shotwell-Johnson Products

Stamped metal and sheet-metal parts for tractors are a specialty with the Shotwell-Johnson Co., Minneapolis. The concern is equipped to make all types of tanks from 14 in. gage metal and lighter. The tanks are either soldered or welded, depending on the kind of material used. Fenders for tractors are made in any desired size, shape or quantity. Tractor radiators using an extra heavy type of core are built by this concern. One of the illustrations herewith shows the fuel tank on the Hart-Parr tractor and a Fordson tractor fender. The tank is built of 16 gage material and welded while the fender is of the rolled-edge crown top type and is built of 18 gage material.

Shotwell-Johnson tractor radiator

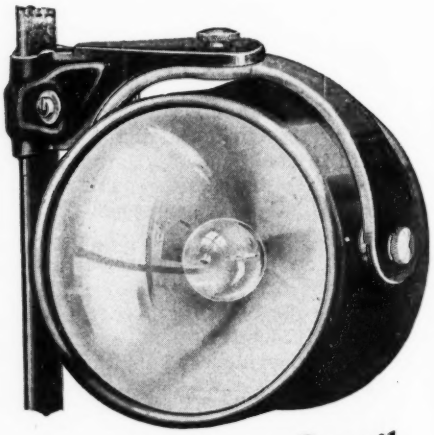


Stewart-Warner vacuum system for tractors

Stewart-Warner Vacuum System

The Stewart vacuum system widely used on passenger cars and trucks also is adapted to tractors. The heavy-duty type tank shown herewith is built on the same principle as the other models but has an increased capacity and quicker filling and emptying facilities. Two sizes are built, one 3¾ pt. and the other 5 pt. The operation of this tank is the same as in the passenger-car type with the exception that there are two flapper valves at the bottom of the inside tank to take care of the increased capacity.

The use of searchlights is becoming quite general on tractors and the one shown herewith is the Stewart V-Ray searchlight. The attaching bracket while designed to fit windshield on passenger cars, can with a little modification be adapted to tractors on which it probably will be necessary to fit some sort of stanchion, for attaching the light.



Stewart - Warner tractor searchlight

The Tractor Must Be Suited to the Farm On Which It Will Be Used and Whether It Is or Not Is Something

THE DEALER MUST KNOW!

The Drawbar Pull is Most Important to the Farmer and the Point Which He Considers in Buying a Tractor. Factory Drawbar Ratings are Based on Favorable Conditions and Any Slight Change in These Conditions Will Affect the Power of the Tractor

A PRACTICAL farmer, after experience covering several years, with at least two makes of tractors, advises a friend to whom he is writing, "to buy a tractor, but be governed by the work you want it to do."

This is general advice, to be sure, and given to a man who had had no experience himself with tractors it would not do him very much good, perhaps, beyond making him cautious about his selection. And this would be a good thing.

The dealer, however, who must sell tractors, cannot get along with such general advice. He must have specific and certain knowledge of what the tractor he sells will do. When the farmer comes to him to talk about buying a tractor the dealer must know beyond any doubt that his tractor will do that work the farmer wants it to do, else he has no right to sell it at all.

Tractor An Important Purchase

The tractor, once it goes onto the farm, becomes the principal source of power for that farm. The purchase of a tractor, regardless of its cost, is the most important single purchase the farmer will make. It may not cost as much as the combined cost of the horses the farmer owns; it may not cost as much as the motor car he probably owns; but it is much more important to the farmer than either horses or motor car because more depends upon it. For this reason the farmer cannot afford to make a mistake. Nor can the dealer afford to give the farmer the wrong advice about what to buy. Still less can the dealer afford to sell the farmer a tractor which is almost certain to be a misfit because the dealer did not know enough about its capabilities to know whether or not it would fit the job.

Tractor ratings are given to the machine upon the basis of what it will do on level ground, in average soil conditions, definite speed and normal conditions. Any modification of any of these factors, however slight, will affect the power of the tractor so that the pull delivered at the drawbar will not correspond to the rating. The belt power of a tractor is hardly ever affected by anything but a departure from normal r.p.m. but the drawbar power of a tractor is affected by many things.

Assuming a constant relation between engine r.p.m. and belt power rating, the same engine at normal r.p.m., while delivering the same power at the belt, may not deliver over half its conventional rating on the drawbar. For instance, a tractor which rates at 10-20 when all conditions are normal, may, when some of the conditions are changed, rate no better than a 5-20 as respects ability to pull at the drawbar.

Judges by Drawbar Ability

Inasmuch as it is something of a habit for the farmer to consider the capability of his tractor by what it will do at the drawbar, this is very important. For, however, strange it may appear to the reader who never has given the matter any attention, there is nothing more variable than the drawbar ability of a tractor. It is affected by factors which have no effect upon the other qualities of the tractor at all. Nevertheless, as long as the farmer thinks of his tractor as primarily a machine which will be used on the drawbar more than it will upon the belt, he will base his judgment of the value of the particular machine upon what it will do under given conditions. And these conditions rarely are twice alike.

For this reason it is peculiarly necessary for the dealer to understand just how the performance of his machine will be affected by varying conditions. The manufacturer will tell him nothing about this; nor will he ever learn it in any other school than that of experience. The rating that is given to him by the manufacturer will be that which conforms to the formula for figuring horse power rating under conditions that are not only normal but favorable, without any regard to the modifications that will be introduced by less favorable conditions.

Yet the dealer may figure with a degree of certainty that in hardly a single instance will he be able to place a tractor where the conditions will be such that the ideal conditions considered by the factory in making the rating will be duplicated. In the vast majority of instances there will be a disturbing factor more or less influence which will make the delivery of power at the drawbar different from that which the factory sells and which the buyer may expect.

Then what is the dealer to do?

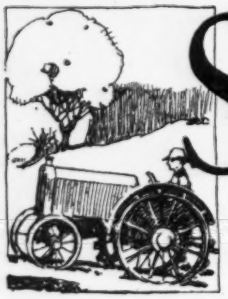
Manifestly, there is nothing for him to do which will insure safety in his representations in selling, but to satisfy himself by experience and demonstration just what his machine will accomplish under given conditions. He must know just what effect a grade, for instance, has upon the drawbar pull of the kind of tractor he sells. This will be different, for example, for a wheel type or a track laying type. He must satisfy himself about this and within certain definite limits he must know just what effect a raise of 1 foot, for instance, in 100 feet of horizontal distance will have in reducing the drawbar pull of his tractor. There are certain definite figures respecting such facts known and the dealer must acquaint himself with them.

Dealer Must Know These Things

He must know also the resistances offered to the passage of a plow bottom by soils of different consistency. These too, are known in a general way, nearly enough at least for all practical purposes, and these the dealer must acquaint himself with and know how to apply.

The fact is this, every individual tractor sale is a distinct problem within itself. It presents a problem in farm engineering, and the dealer who does not possess the requisite information and knowledge about how the various factors which affect tractor operation influence tractor performance is at a competitive disadvantage.

There is nothing about the things the dealer should know that is at all difficult to understand. All it requires is a knowledge of a few fundamental facts and the ability to apply them to the individual case. There are dealers who never sell a tractor until they first have visited the farm upon which it is to be used and have made an investigation of the soil conditions, the grades and other things which affect tractor efficiency. They then are in a position where they can safely say what their particular tractor can do under the conditions that exist.



Standard Mechanical Operations in Tractor Service

by John Charles Thorpe, M.E. and Gustav Howard Radebaugh

Editor's Note—This is the second installment of the series of articles on Standard Mechanical Operations in Tractor Service which has been prepared to enable the automotive dealer and repairman to give the best possible service on tractors generally. While most of the illustrations are confined to a single make of tractor the operations are much the same on other pieces of automotive apparatus. The operations are standard, hence they will apply to any internal combustion engine, whether stationary, tractor, truck or passenger car.

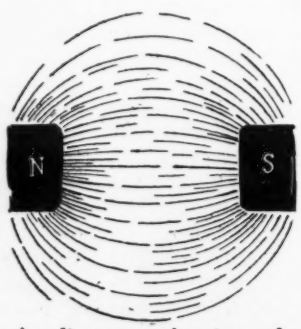
Part II—Fundamental Electrical Principles

INTRODUCTORY. It is probable that records would show if they were available, that eighty per cent of the interruptions in the service of internal combustion engines are due to electrical troubles. A great many troubles of a mechanical nature would hardly appear as a record of service interruptions due to the ability of the operator to remedy them promptly. The conclusion is, therefore, that most operators familiarize themselves early in their experience with most of the troubles and their remedies that would be classed as strictly mechanical. Similarly, the conclusion is reached that comparatively few operators have the knowledge and ability to remedy electrical troubles.

Since the earliest days of electrical science there has seemed to be a great mystery surrounding the word "electricity" and even those with years of experience in the use of machinery dependent upon electrical energy for its operation, have not had the courage to penetrate the mysterious veil. This may be due to the absence of a definition of electricity that will satisfy the lay mind, and yet many of the phenomena due to the exercise of electrical energy, are quite familiar. It is necessary that electrical phenomena be recognized, studied and exploited, to the end that knowledge and skill may be gained for the solution of the electrical problems that present themselves in the care, maintenance and operation of the Farm Tractor.

MAGNETISM

From their earliest childhood men have played with electrical energy. Who does not remember the school boy with the horse-shoe magnet with its train of tacks, pins, nails, etc. The ability of the magnet to attract such articles and once having attracted them, to hold them against considerable strain, proved the existence of a force. The fact that such attraction varied with the position of the article, both in distance and direction from the ends or poles of the magnet, indicated that the magnetic force was confined to a certain area or field about the poles. The general character and extent of this field is indicated if a thin layer of iron filings is shaken upon a sheet of paper and tapped gently from underneath with the poles or ends of the magnet. The filings tend to arrange themselves along elliptical lines as indicated in the figure and the strength of the field is said to be measured by the number of lines, called lines of magnetic force.



A diagram showing the magnetic lines of force

A common experiment in magnetism is performed by the school boy in rubbing his pocket knife blade vigorously across the pole of the magnet and then picking up pins, tacks, etc., with it. The blade is said to be magnetized. In a crude way this may be said to illustrate a common electrical phenomenon, Induction; that is, magnetism is induced in the knife blade by its contact with the magnet and its rapid motion in the magnetic field.

The ends or poles of the magnet are called North (N or positive) and South (S or negative), the distinction being determined by suspending a bar or straight magnet by a silk thread, allowing it to come to rest and observing that the bar extends north and south, one end, called the North pole, pointing in the direction of the north magnetic pole of the earth. It is upon this principle that the construction of the ordinary pocket compass is based.

If the North poles of two magnets, or two South poles are brought together a repelling force is felt as the poles approach each other; on the other hand, if a North pole and a South pole are brought together, an attracting force is felt as the poles approach each other. This illustrates the familiar statement that like poles repel and unlike poles attract. This explains the reason for placing like poles of the double or compound magnets used in magnetos together. Otherwise, the magnetic force would be balanced or neutralized and would have no effect upon the armature rotating between the poles.

Magnets are permanent or temporary depending upon the material composing them. Magnets of high grade steel retain their magnetism for a long period and are therefore called permanent. Magnets of soft iron or steel lose their magnetism rapidly and are called temporary.

ELECTRIC CURRENTS

Electricity flowing in wires acts much like water flowing in pipes or even in open channels. If two vessels of water at different levels are connected by pipe or open channel, the water will flow from the upper to the lower level until the supply is exhausted or until the levels are equalized. Similarly, two points of unequal electrical pressure connected by cable or wire will experience a flow of current from the point of high pressure until the pressures are equalized or until the high point has discharged its energy. If a continuance of the flow of water is desired some device, such as a pump, is used to maintain the supply. Similarly, some source of electrical energy, such as a magneto is used to maintain the flow of elec-

trical energy by connecting it to the system. In extending the water system to a practical use, there must be a source of supply to the pump, and so as the water is wasted at the low level it finds its way back by drainage or seepage to the well or reservoir. Similarly, the cycle of operations is completed in an electric ignition system, by connecting the point of dissipation of electrical energy with the magneto by the connection called the "ground." Thus, a closed circuit is necessary for the continuous flow of electrical energy.

It is found that a magnetic field is established about a coil of wire through which a current is passed. Also, that, if a soft iron bar or core is placed within the coil, it becomes magnetized, if the current is alternately made and broken, showing that, as in the crude illustration of the pocket knife, magnetism is produced by moving the magnetic field on and off the core. This illustrates the principle utilized in the primary circuit of magnetos and induction coils. Similarly it is found that if another coil is wound about the primary coil and the same action of making and breaking the circuit is pursued, a current is set up, or induced in the second coil. Furthermore, if the second coil is made of smaller wire of a great number of turns, the current has a much higher pressure or voltage. It is explained by saying that the greater the number of turns, the greater number of lines of force are cut and therefore the greater the intensity of the current. It must be undestood that the secondary coil being fixed and having no source of current in the line, the action of creating and destroying the magnetic field is the same as if the coil were moved in the magnetic field of a permanent magnet. This, very briefly describes the action of the magneto in creating the high tension current upon which ignition depends.

HIGH TENSION IGNITION

Two methods of ignition are used in internal combusion engines—one, called the jump spark or high tension system; the other the make and break method, commonly called the low tension system. In the former a spark is made to jump the gap between two slightly separated firing points or electrodes, set in a spark plug, insulated from each other and all within the cylinder. In the latter, the spark is caused by two moving terminals, set in the cylinder walls, which are first brought into contact to close the circuit momentarily, allowing the current to flow, and then quickly separated. The high tension system is used in tractor engines.

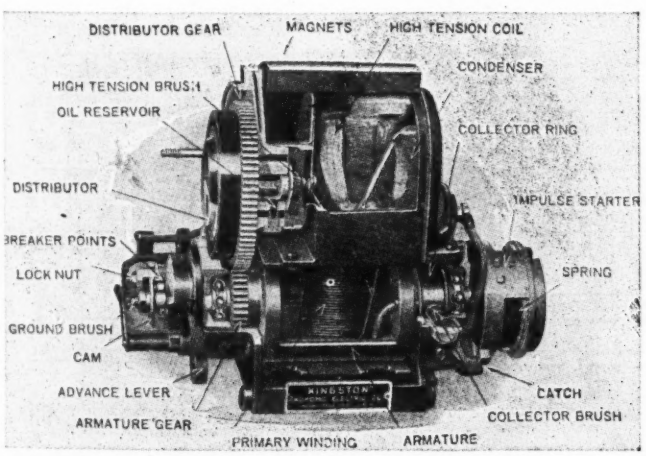


Fig. 2. Cutaway section of a popular type of tractor magneto

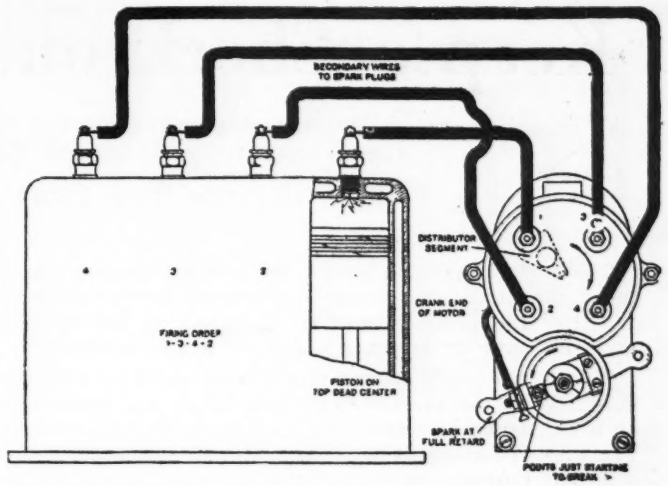
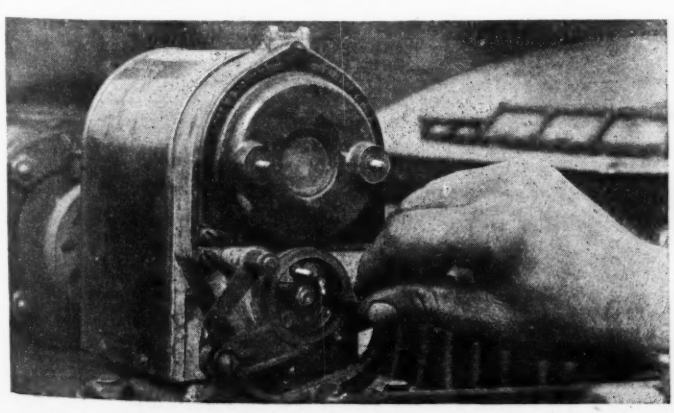

SECONDARY WIRES TO SPARK PLUGS
DISTRIBUTOR SEGMENT
CRANK END OF MOTOR
FIRING ORDER 1-3-4-2
PISTON ON TOP DEAD CENTER
SPARK AT FULL RETARD
POINTS JUST STARTING TO BREAK

Fig. 3. Arrangement of ignition cables connecting the magneto with the spark plug

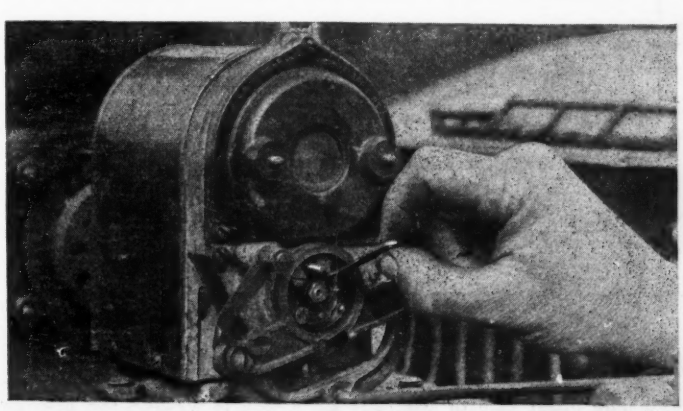
The high tension system consists fundamentally of the following apparatus: A source of current (battery, mechanical generator or magneto); an induction coil for producing a high tension current by electro-magnetic induction; an interrupter or timer operated from the engine for producing the spark at just the right moment of the engine cycle; a spark plug, or set of plugs, with the necessary wiring or cable to carry the ignition current from its source to the spark plugs. In the construction of the magneto, the induction coil, timer or interrupter, and the source of current are combined in one mechanical assembly or unit.

Figure 2 represents a cutaway section of a popular type of tractor magneto. This figure should be studied carefully in preparation for the subsequent considerations of magneto troubles and their remedies. Special attention is directed to the location and general design of the high tension coil, the primary winding, the distributer, the breaker, the collector brush and ring, and the impulse starter.

Figure three shows the arrangement of ignition cables connecting the magneto with the spark plugs. Cylinder Number 1 is cut away showing the piston just ready to begin its power stroke, just after the fuel charge has been fired as indicated by the spark at the spark plug points.



Testing breaker point clearance of the contacts of the magneto



Adjusting the clearance of points and tightening the lock nuts affair adjustment

Keep a Check on Your Service Work

Here is a System Which Can Be Kept with Little Trouble and Will Give You Immediate Information on Each Job

The Rude Motor Co., Perry, Ia., keeps a complete card index file of all car, truck and tractor prospects, from the time the prospect first is discerned on the horizon until he buys or becomes definitely a non-prospect.

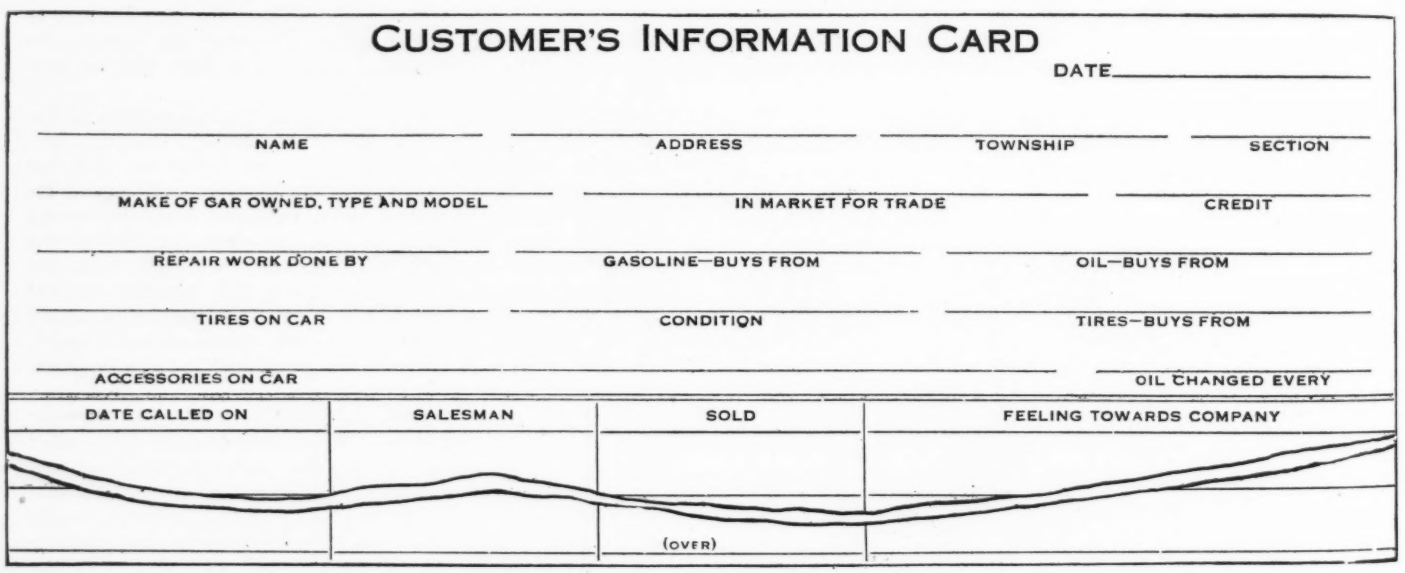
With a few modifications this system could be used for checking up the service work that either has been done on a car, truck or tractor, or for getting in future work. The whole plan simply resolves itself into getting together sufficient information so that the dealer is in position to intelligently handle the case, whether it be selling a car or servicing a truck.

There is no great novelty about this, a common stock card which any motor car company may buy being used. The feature of the Rude plan is the completeness of the record kept and its instant availability.

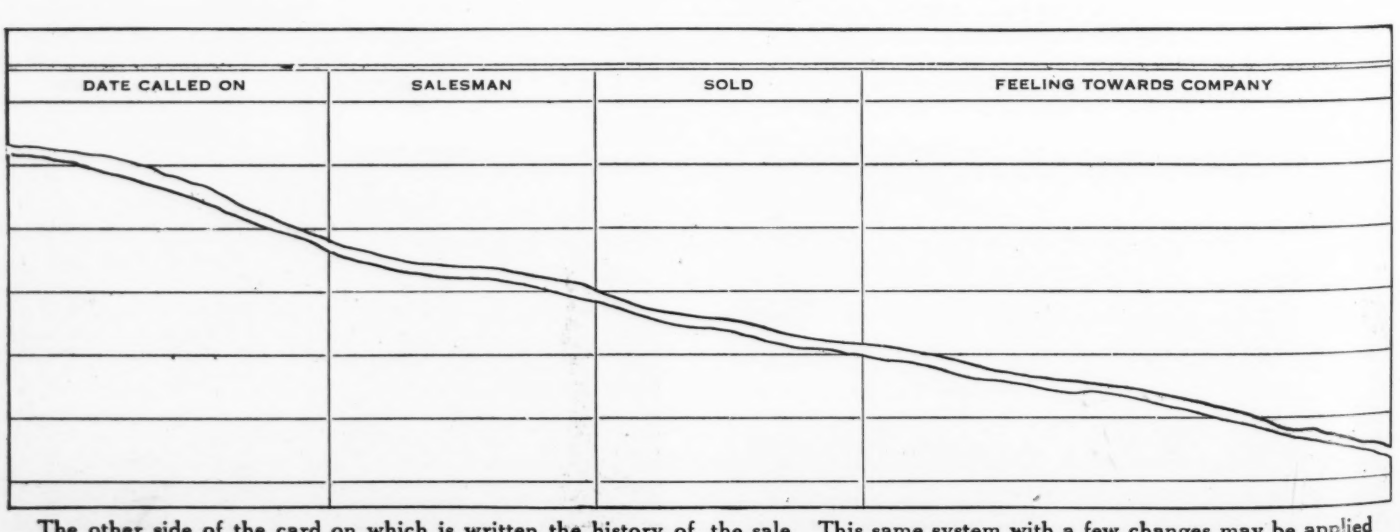
A daily report of the activities of every salesman in the employ of the company is obligatory. These reports are at once entered on the cards, which are then placed alphabetically in a card index file in the office. Thus the actual status of every prospect the company has is known right up to the minute.

Every morning from Monday until Saturday the salesmen meet the manager in conference before the day's work is begun. The cards which the tickler has brought up for the day's work are gone over and the work assigned. This introduces a definiteness and system into the daily work of canvassing for sales which is reflected in results attained.

The card system used is by no means complicated and its maintenance part of the duty of every salesman. It takes but a few minutes' work a day to make the entries and is a detail which soon becomes so habitual that the men never think about it as a task. It's just part of the daily routine. Its value is unquestionable.



This shows the card used by the Rude Motor Co. in getting and keeping a line on their prospects



The other side of the card on which is written the history of the sale. This same system with a few changes may be applied to keeping record of service work

Buyers Guide to Farm Tractors

The prices given herewith are the latest list prices but are subject to change. The horse-power rating is that given out by the various manufacturers. Under the heading traction W means wheel and CR. crawler. Under engines Ver. means vertical and Hor. horizontal. G, K, and D under Fuel, means respectively, gasoline, kerosene and distillate.

FACTORY RATING OF HORSEPOWER USED

ONE AND TWO PLOW TRACTORS

Name and Model	HP.	HP.	Price	Traction	Cylinders	Fuel
Appleton	12	20	$1650	2 w.	4 ver.	G-K-D
Allis-Chalmers	6	12	695	2 w.	4 ver.	G
Automotive	12	25		2 w.	4 ver.	G-K
Avery	7	12		2 w.	6 ver.	G
Avery	8	16		2 w.	2 hor.	G-K
Bull	12	24	1200	1 w.	2 hor.	G-K-D
Case	10	18	1200	2 w.	4 ver.	K
Cletrac	12	20	1585	2 cr.	4 ver.	G-K-D
Eagle	12	22	1400	2 w.	2 hor.	G-K-D
Fageol	9	12	1525	2 w.	4 ver.	K
Fordson	12	20	750	2 w.	4 ver.	K
Heider	9	16		2 w.	4 ver.	G-K
Indiana	5	10		2 w.	4 ver.	K
International	8	16		2 w.	4 ver.	G-K-D
La Crosse	7	12	750	2 w.	2 hor.	K
Leader	12	24	1285	2 w.	4 ver.	K
Moline	9	18	1500	2 w.	4 ver.	G
Monarch	9	16	1550	2 cr.	4 ver.	G-K
Post				2 w.	4 ver.	G-K
Shelby	9	18		2 w.	4 ver.	G
Toro	7	12	900	2 w.	4 ver.	K
Vim	10	20	1485	2 w.	4 ver.	G-K
Wetmore	12	25	1385	2 w.	4 ver.	G

THREE-PLOW TRACTORS

Advance-Rumely	12	20		2 w.	2 hor.	K-D
Allis-Chalmers	18	30	1785	2 w.	2 ver.	K
Allwork	14	28	1650	2 w.	4 ver.	G-K-D
Appleton	12	20		2 w.	2 ver.	G-K
Avery	12	25		2 w.	2 hor.	G-K-D
Avery	14	28		2 w.	4 hor.	G-K-D
Bales	15	22	1985	2 cr.	4 ver.	G-K-D
Best	12	25		1 cr.	4 ver.	D
Bull	12	24	1200	1 w.	2 hor.	G-K-D
Burn-Oil	15	30	1550	2 w.	2 hor.	K
Case	15	27	1600	2 w.	4 ver.	K
Dort	12	25	1850	2 w.	4 ver.	G
Dort	15	30	2000	2 w.	4 ver.	G
Dauch	10	20	1650	2 w.	4 ver.	G
Eagle	16	30	1850	2 w.	2 hor.	G-K-D
E-B aa	12	20		2 w.	4 ver.	K
E-B Q	12	20		2 w.	4 ver.	K
Frick	12	24		2 w.	4 ver.	K
Four Drive	20	35	2800	4 w.	4 ver.	K
-G.O.	14	28	1485	2 w.	4 ver.	G-K
Graham	15	30		2 w.	4 ver.	K
Heider	12	20		2 w.	4 ver.	G-K
Hart-Parr	15	30	1395	2 w.	2 hor.	K
Huber	12	25		2 w.	4 ver.	G-K
J. T.	16	40	2800	2 cr.	4 ver.	G-K
Keck-Gonnerman	12	24	1500	2 w.	2 hor.	K
La Crosse	12	24	1250	2 w.	2 hor.	K
Lauson	15	30	2150	2 w.	4 ver.	G-K-D
Leader	18	36	2475	2 cr.	4 ver.	K
Parrett	12	25		2 w.	4 ver.	K
Peoria	12	25	1985	2 w.	4 ver.	K
Plow Man	15	30	1895	2 w.	4 ver.	G-K
Pope	15	27	1750	Dv.	4 ver.	K
Reed	12	25	1685	2 w.	4 ver.	G-K
Short Turn	20	40	1500	1 w.	4 ver.	G-K
Square Turn	18	35	1875	2 w.	4 ver.	G-K
Titan	10	20		2 w.	2 hor.	G-K-D
Topp-Stewart	20	35	3000	2 w.	4 ver.	G
Turner	14	30	1675	2 w.	4 ver.	G-K
Twin City	12	20	1595	2 w.	4 ver.	G-K
U. S.	20	30	2300	2 w.	4 ver.	K
Wallis	15	25		2 w.	4 ver.	G-K-D
Waterloo Boy	12	25		2 w.	2 hor.	K
Wisconsin	16	30		2 w.	4 ver.	K
Yuba	12	20	2945	2 cr.	4 ver.	D

FOUR-PLOW TRACTORS

Advance-Rumely	16	30		2 w.	2 hor.	K-D
Allis-Chalmers	18	30	1785	2 w.	4 hor.	K
Aulliman-Taylor	15	30	2300	2 w.	4 ver.	G-K-D
Avery	12	25		2 w.	2 hor.	G-K-D
Avery	14	28		2 w.	4 hor.	G-K-D
Avery	18	36		2 w.	4 hor.	G-K-D
Bates	15	22	1985	2 cr.	4 ver.	G-K-D
Best	12	25	2600	2 cr.	4 ver.	D
Buckeye	25	40	3750	2 cr.	4 ver.	G-K-D
Case	22	40	26....	2 w.	4 ver.	K
Dort	15	30	2000	2 w.	4 ver.	G
Dauch	15	35	2500	2 w.	4 ver.	G-K-D
Flour City	20	35		2 w.	4 ver.	G-K
Four Drive	20	35	2800	4 w.	4 ver.	K
G.O.	14	28	1485	2 w.	4 ver.	G-K
Gray	18	36		Dr.	4 ver.	K
Hart-Parr	15	30	1395	2 w.	2 hor.	K
Holt	25	40		2 cr.	4 ver.	G
Illinois	18	30	2375	2 w.	4 ver.	K
International	15	30		2 w.	4 hor.	G-K-D
Lauson	15	30	2150	2 w.	4 ver.	G-K-D
Leader	18	36	2495	2 cr.	4 ver.	K
Leader	20	40	2750	2 cr.	4 ver.	K
Liberty	18	32	2475	2 w.	4 ver.	G-K
Monarch	30	18	2550	2 cr.	4 ver.	G-K
Pioneer	18	36		2 w.	4 ver.	G
Plow Man	15	30	1895	2 w.	4 ver.	G-K
Stinson	18	36	1800	2 w.	4 ver.	K
Twin City	16	30	2400	2 w.	4 ver.	G-K
Topp-Stewart	20	35	3000	2 w.	4 ver.	G
Wisconsin	16	30		2 w.	4 ver.	K

FIVE AND SIX-PLOW TRACTORS

Advance-Rumely	20	40		2 w.	2 hor.	K-D
Aulliman-Taylor	22	45	3700	2 w.	2 hor.	G-K-D
Avery	25	50		2 w.	4 hor.	G-K-D
Case	22	40	2600	2 w.	4 ver.	K
E-B	20	35		2 w.	4 ver.	K
Flour City	20	35		2 w.	4 ver.	G-K
Flour City	30	50		2 w.	4 ver.	G-K
Holt	25	40		2 cr.	4 ver.	G
Holt	40	60		2 cr.	4 ver.	G
Leader	20	40		2 w.	4 ver.	K-D
Nichols Shepard	25	50		2 w.	2 hor.	K
Twin City	25	45	3800	2 w.	4 ver.	G-K
Yuber	20	35	4465	2 cr.	4 ver.	D

EIGHT-PLOW AND LARGER TRACTORS

Advance-Rumely	30	60		2 w.	2 hor.	K-D
Aulliman-Taylor	30	60	4800	2 w.	4 hor.	G-K-D
Avery	40	60		2 w.	4 hor.	G-K-D
Best	35	60	5750	2 cr.	4 ver.	D
Flour City	30	40		2 w.	4 ver.	G-K
E-B	40	65		2 w.	4 ver.	K
Flour City	30	40		2 w.	4 ver.	G-K
Flour City	40	70		2 w.	4 ver.	G-K
Holt	40	60		2 cr.	4 ver.	G
Nichols Shepard	35	70		2 w.	2 hor.	K
Pioneer	30	60		2 w.	4 ver.	G-K
Twin City	40	65	4850	2 w.	2 ver.	G-K
Twin City	60	90	5850	2 w.	6 ver.	G-K

RECOMMENDED POWER EQUIPMENT FOR TRACTORS

The table on the opposite page has been prepared by MOTOR AGE for the automotive dealer so that he might tell his customers just what sort of power equipment will go with certain makes of tractors. The pictures herewith show a silo filler and thresher and illustrate the sort of equipment with which the dealer must become familiarized in his work of selling and servicing tractors and the great multitude of machinery involved in power farming

The picture on the right shows a typical scene wherein a tractor is used for belt work. One thing to remember in a tractor is that the latter never "coasts" like a passenger car. It's engine is working under heavy loads all the time

RECENTLY a farmer who was, and still is, a prospect for a tractor went to the dealer in his town for information.

"I have a farm of so many acres," said he, "and my crops are such and such, I want to use power farming methods and I want to know what size tractor I need, what size grain separator, how big a silo filler I want for my silo, etc. Make out for me a complete list of all the power machinery, from plow to threshing machine, I will need to outfit my farm to the best advantage and I'll buy it."

The dealer was stumped. He did not know. All he had was the general notion that the particular tractor he represented was about what that farmer ought to have, but he found he was hopelessly at sea when he began to figure on the proper machinery to recommend with it.

The net result to date is that the farmer has not bought and he says he won't until he can find a dealer who can tell him confidently the size and type of tractor which is the best suited to his needs and who also can tell him as confidently what size of tractor drawn and tractor driven machinery he should have to work with it.

Because that dealer did not know he lost or indefinitely deferred a cash sale which would have run considerably over $3,000.

And there are lots of dealers who have no better notion of what the farmer ought to have. And because they do not know they are losing business or, what is worse, they are selling the wrong combination of machines.

In order to help the dealer out who is confronted with a dilemma like this and to enable him to make something like an intelligible reply when he is asked for similar information, MOTOR AGE presents the accompanying table of recommendations made by the manufacturer of the tractor in every case, and a blank in the table means that the particular manufacturer declined to commit himself. But as far as the recommendations go they may be relied upon and the dealer may use them with confidence.

In this connection MOTOR AGE recommends that dealers cut out this table, and also the table of belt speeds which also appears in this issue, and tack or paste them up on the wall of his office where they may be referred to readily. Taken together they will solve almost any problem of tractor and power machine coordination which will be presented to him.

The table of belt speeds is especially valuable as it will enable the dealer at all times to tell the farmer just what size of pulley he should have on his tractor and the power driven machine so that at normal revolutions per minute the belt speed imparted to the belt by the tractor pulley will be approximately the same as that imparted by the pulley on the driven machine.

It is of the first importance that this coordination should be correct. Neither tractor nor machine will do its best work otherwise. And with the present confusion regarding belt speed and the absence of all standardization in pulley sizes, it is sometimes difficult for the dealer and the farmer to determine just what combination of pulleys the former ought to have.

With the two tables presented herewith it is believed the dealer will have no difficulty in solving any ordinary power riddle which presents itself, provided only that the right tractor has been selected in the first place. But that is another story. The selection of the right tractor is determined by a totally different set of considerations, but a set which the dealer who has had even a brief experience in the tractor business may be presumed to know all about.

Chart Showing Tractor Specifications and Recommended Power Equipment

MAKE OF TRACTOR	Rating of Model	Drawbar Pull in Pounds	Number of Plows Recommended 14-in. Bolts	Brake Horse Power	Size of Pulley Diameter	Normal R. P. M.	Grain Separator Size Cyl.	RECOMMENDED SIZE POWER DRIVEN MACHINE				
								Silo Fillers Size Cutter Head	Corn Shellers No. Holes	Feed Grinders Bu. Cap. per Hour	Shredder No. Holes	Hay Balers Size Bale Chamber
Advance-Rumely	12–20	2150	3	20	19	560	22				6	Any
Advance-Rumely	16–30	2850	4	30	23	530	28				8	Any
Advance-Rumely	20–40	3750	6	40	26	450	32				12	Any
Advance-Rumely	30–60	5900	8–10 (1–16)	60	36	375	36				Any	Any
Allis-Chalmers	6–12	1000	2–10	12	10	1000	None	18	2		4	
Allis-Chalmers	10–18	1650	2–3	18	14½	720	22	20	4		6	
Allis-Chalmers	18–30	3000	3–4	30	15	830	28	Any	6		Any	
Appleton	12–20	2000	3	20	12	825	24	18	6	10	6–8	18x22
Aultman-Taylor	15–30	3500	4	30	20	800	28	16			6	Any
Aultman-Taylor	22–45	4800	6	45	20	600	32	20			10	Any
Aultman-Taylor	30–60	8000	8–10	60	24	500	36	Any			Any	Any
Automotive	12–24	2000	2	24	10	1000						
Avery	5–10	800	2	10	12	1200	22					
Avery	8–16	1800	2–3	16	18	750	22					
Avery	12–25	2800	3–4	25	19½	700	20					
Avery	14–28	3000	3–4	28	16	900	24					
Avery	18–36	3500	4–5	36	18	750	28					
Avery	25–50	4800	5–6	50	22	700	32					
Avery	40–80	8600	8–10	80	26	600	36					
Bates	15–22	2800	3–4	22	12	900	28	20	12	40	6	16x18
Best	35–60	6000	6–10	60	16	650						
Buckeye	25–40	4500	4	40	10	850	28					
Burn-Oil	15–30		3	30	13	750						
Case Plow	15–25	2600	3	25	18	850	24	16	6			Any
Case T. M.	10–18	1500	2–3	18	14½	1050	20	10	4	35–45	2–4	Any
Case T. M.	15–27	2500	3–4	27	16	900	26	16	6	60–75	4–6	Any
Case T. M.	22–40	3800	4–5	40	16½	850	32	20	Any	100–150	6–8	Any
Case T. M.	30–60	5000	6–8	60	32	365	36	26	Any	150–200	8–10	Any
Cleveland	12–20	1285	2	20	8	1200	24	18	8	60–120	8	18x22
Dort	12–25	2000	3	25	12	1050	24	14				
Dort	15–30	2250	3–4	30	12	1050	26	17				
Dauch												
Dauch												
Dayton-Dowd	12–18	2000	2	25	14	800	22	16	4	20–75	6	19x24
Dayton-Dowd	16–32	3000	3–4	32	14	800	28	19	6	50–150	8	22x26
Dayton-Dowd	18–36	4000	4	36	14	750	32	22½	Any	50–175	10	22x26
Eagle	12–22		3	22	20	450		12				
Eagle	16–30		4	30	24	450						
Electric	14–28	3000	3	28	12½	800	28	16				
E-B	12–20AA	2600	3	20	12	900	26		Any	Any	6	Any
E-B	12–20Q	2000	3	20	12	850	24		Any	Any	8	Any
E-B	20–35	3300	5	35	16	750	28		Any	Any	12	Any
E-B	40–65	10,000	8–10 (3–10)	65	22	500	44		Any	Any	Any	Any
Fageol	9–12	1450	2	12	8	1250						
Ford	12–20		2	20	9½	1000	22					
Four Drive	20–35	3200	4	35	14	800	26	16			10–12	Any
Frick	12–24		3	24	13	900	22					Any
	15–30		3–4	30	13	900	26					Any
G-O	14–28											
General	9–16	1600	2	16	9	665	20					
General	18–30	3000	4	30	16	600	32					
Gray	18–36	2700	4	36	11¾	850	28					
Hart-Parr	15–30	3000	3	30	14	750	26	19	6–8	100	6	17x22
Holt	25–40	6200	4	40	8½	1000	32					
Holt	40–60	8600	6	60	10½	800	40					
Holt	50–75	9000	8	75	16	470	40					
Holt	70–120	12000	12	120	16	470						
Huber	12–25		3	25	13	1000	24	16			6	Any
Illinois	18–30	3500	4	30	14	600	28	22				
Indiana	5–10	1000	1–16 in.	10	7	950		13		30	4	
International	8–16	1350	2	16	12¼	1000	20		4		4	14x18
International	10–20	1800	3	20	18	575	24		cyl.		6–8	16x18
International	15–30	2500	4	30	18	575	28		cyl.		8–10	17x22
J. T.	16–30	3200	3–4	40	10	1000	30	18	8		8	
Keck-Gonnerman	12–24											
Kinnard	14–24		3	24	26	320	24					
Kinnard	20–35		4–5	35	26	350	28					
Kinnard	30–50		6–8	50	32	275	32					
Kinnard	40–70		8–10	70	34	275	36					
La Crosse	7–12	1200	2	12	10	1000						
La Crosse	12–24	2000	3	24	11	900					4	
Lauson	15–30	3000	3–4	30	18	475	30	Any	Cyl.	Any	8	Any
Liberty	18–32	2700	4	32	11	900	30	20				
Minneapolis	12–20	2000	3	20	16	650	22	16	8	50–75	6	18x22
Minneapolis	16–30	3000	4	30	17	528	24	18				
Minneapolis	25–45	6700	6	45	20	600	28					
Minneapolis	40–65	7500	8	65	23	535	36					
Minneapolis	60–90	11250	12	90	23	535	40					
Moline	9–18	2000	2	18	9	1650						
Parrett	12–25	2800	3	25	12	1000						
Peoria	12–25	3000	3	25	14	650	26	14–16	6	50–75		
Pioneer	18–36	4000	4	40		750	28	Any	Any	Any	Any	Any
Pioneer	30–60	8000	10	75		650	40	Any	Any	Any	Any	Any
Plowman	15–30	3000	3–4	30	14	1000	30					
Pope	15–27	2100	3	27	14	800	24	16	6	50–70	6	Any
Port Huron	12–25	2200	3	25	14	900	22		6	30–50	8	17x22
Rock Island	9–16	1500	2	16	12	700						
Rock Island	12–20	2000	3	20	14	600						
Russell	12–24	2000	2–3	24	12	1000	20					
Russell	15–30	2800	3–4	30	12½	950						
Russell	20–35	4000	4–5	35	12½	825						
Russell	30–60	6000	8–10	60	24	525						
Shelby	9–18											
Short Turn	28–42		3	42	18	950	26					
Square Turn	18–35	3200	3	35	12	850	28					
Stinson	18–36	4000	4	36	12	950	30					
Topp-Stewart	30–45	5000	4–6	30	10	900	Sold only for contracter and road work					
Turner	14–25	3100	3	25	14	650	24	24	8		10	18x22
U. S.	20–30	3000	3	30	11	900	28	13	Cyl.	50–75	Any	Any
Vim	10–20	1600	2	20	10	1000	22	14			4	16x18
Waterloo	12–25	2000	3	25	14	750						
Wetmore	12–25		2	25	12	900	22		8			
Wisconsin	16–30	3500	3–4	30	16	600	28	20		60	8	Any
Yuba	12–20	3400	3	20	12	700	20					
Yuba	25–40	6500	6	40	10–14	700	26					

Tractor Belt Speed Table—Save These

Examples Given Are From Actual Tractor Helps Dealer to Tell Customers Relation

REFERRING to the table: In the first column run the pencil point down to 24. Follow across the table to the right on a line corresponding to 25 until the column headed 500 is reached. Here will be found the belt speed for the given pulley diameter and engine r.p.m. In this case this is 3140.

But the thresher must run at 850 r.p.m. Refer again to the table: At the top of the table find the column headed 850. Look down this column for 3140. If not found exactly, take that number which is the nearest to it. In this case the number which approximates most nearly to 3140 is 3114. Following to the left the horizontal line in which 3114 is the corresponding pulley diameter is found to be 14. This is found in the first column of the table and is the diameter of the pulley which should be put onto the thresher.

In other words, a 24-in. pulley on the tractor running at 500 r.p.m., will impart the same approximate speed to a belt that would be given to it by a pulley of 14 in. diameter, running at 850 r.p.m. Or, if the tractor with 500 r.p.m. has a pulley of 24 in. diameter, its speed will correspond approximately to that of a threshing machine with 850 r.p.m. and with a pulley of 14 in. diameter. In short, this is co-ordination between power unit and power-driven machine and the best and most efficient work from both may be expected.

Take another example: The tractor has 800 r.p.m. and the pulley a diameter of 14 in. The thresher must run at 1200 r.p.m. In the line which runs across the table horizontally from 14, in the column under 800, a belt speed of 2932 r.p.m. is indicated. In the column under 1200 the nearest approximation to this speed is found to be 2982; which, followed to the left horizontally indicates a required diameter for the thresher pulley of 9½ in.

Sometimes the correspondence is exact. For instance: A tractor with 1000 r.p.m. and 8 in. pulley, must drive a corn husker with a required r.p.m. of 1000. It is evident at a glance that the pulley on the corn husker must be 8 in. in diameter also.

If, however, the corn husker demands 1200 r.p.m., then, using the table in the manner indicated, it is found that the tractor will impart a speed to the belt of 2029 r.p.m. At 1200 r.p.m. for the corn husker the belt speed in the table which most nearly corresponds to 2029 is found to be 2040, indicating a pulley of 6½ in. diameter as necessary for the corn husker.

It must be understood that these results as given by the table are close approximations only. They are near enough, however, for all practical purposes. For instance: In the first example given there is only 26 ft. difference in the belt speed between a pulley of 24 in. diameter running at 500 r.p.m. and a pulley of 14 in. diameter running at 850 r.p.m. This difference is too small to affect the efficiency of the machine adversely and therefore it may be disregarded.

PULLEY REVOLUT
(Belt speeds are give

PULLEY DIAMETER IN INCHES	200	250	300	350	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750	775	800	825
5	262	327	393	458	524	556	589	622	655	687	720	752	785	818	851	883	916	949	982	1015	1047	1080
5½	288	359	432	504	576	611	647	682	718	749	781	822	864	899	936	970	1008	1043	1080	1114	1152	1181
6	314	392	471	549	628	677	706	754	784	823	863	902	942	991	1020	1069	1098	1148	1177	1225	1256	1294
6½	340	425	510	595	680	722	765	807	850	892	935	977	1020	1062	1105	1177	1190	1232	1275	1317	1360	1402
7	366	457	549	640	732	777	823	868	914	960	1006	1052	1098	1143	1189	1234	1280	1326	1372	1417	1464	1509
7½	392	490	583	683	784	833	882	937	980	1029	1078	1127	1176	1225	1266	1323	1366	1416	1467	1514	1568	1612
8	418	523	627	731	836	888	941	993	1046	1148	1150	1202	1254	1306	1358	1411	1462	1515	1567	1620	1672	1775
8½	445	556	667	778	890	945	1001	1056	1112	1167	1223	1279	1335	1390	1445	1501	1556	1612	1668	1723	1780	1834
9	471	588	706	824	942	995	1059	1117	1176	1235	1294	1353	1413	1466	1530	1583	1648	1701	1766	1823	1884	1941
9½	497	621	745	869	994	1056	1118	1180	1242	1304	1366	1428	1491	1553	1614	1677	1738	1801	1863	1925	1988	2049
10	524	654	786	917	1048	1113	1178	1243	1308	1374	1440	1506	1572	1637	1703	1767	1834	1899	1965	2029	2096	2160
10½	550	686	825	962	1100	1168	1236	1304	1372	1441	1511	1580	1650	1718	1787	1854	1924	1993	2062	2129	2200	2266
11	576	719	864	1008	1152	1223	1295	1366	1438	1510	1583	1655	1728	1799	1872	1942	2016	2087	2160	2230	2304	2374
11½	602	752	903	1053	1204	1279	1354	1429	1504	1579	1655	1730	1806	1881	1956	2031	2106	2182	2257	2332	2408	2482
12	628	784	942	1099	1256	1334	1412	1490	1568	1647	1726	1805	1884	1962	2041	2122	2198	2276	2355	2432	2512	2589
12½	654	817	981	1144	1308	1389	1471	1547	1624	1708	1793	1877	1962	2043	2125	2201	2288	2370	2452	2528	2616	2689
13	681	850	1021	1191	1362	1446	1531	1615	1700	1787	1871	1957	2043	2127	2212	2296	2382	2467	2553	2630	2724	2808
13½	707	883	1060	1237	1414	1502	1590	1678	1766	1854	1943	2032	2121	2209	2297	2385	2474	2562	2651	2738	2828	2914
14	733	915	1099	1282	1466	1557	1648	1739	1830	1922	2014	2106	2199	2290	2381	2472	2564	2656	2748	2838	2932	3021
14½	759	948	1138	1328	1518	1612	1707	1801	1896	1991	2086	2181	2277	2371	2466	2560	2656	2750	2846	2939	3036	3129
15	786	981	1179	1375	1572	1669	1767	1864	1962	2061	2160	2259	2358	2455	2554	2650	2750	2848	2947	3043	3144	3240
16	838	1046	1257	1466	1676	1780	1884	1988	2092	2197	2303	2408	2514	2618	2723	2826	2932	3037	3142	3245	3352	3454
17	870	1112	1305	1522	1740	1861	1982	2103	2224	2320	2417	2513	2610	2731	2827	2973	3044	3166	3262	3408	3480	2625
18	943	1178	1364	1625	1886	2003	2121	2238	2356	2449	2542	2635	2729	2946	2989	3181	3250	3367	3511	3602	3762	3813
19	995	1243	1492	1741	1990	2114	2238	2362	2486	2610	2735	2860	2985	3109	3233	3357	3482	3606	3731	3854	3980	4102
20	1048	1309	1572	1834	2096	2226	2357	2487	2618	2749	2881	3012	3144	3274	3406	3535	3668	3798	3930	4059	4192	.....
21	1100	1374	1650	1925	2200	2337	2474	2611	2748	2886	3024	3162	3300	3437	3575	3711	3850	3987	4125	.....	.....	.....
22	1152	1439	1728	2016	2304	2447	2591	2734	2878	3022	3167	3311	3456	3599	3744	3886	4032	4175	.....	.....	.....	.....
23	1205	1505	1807	2108	2410	2560	2710	2860	3010	3161	3312	3463	3615	3765	3915	4065	.....	.....	.....	.....	.....	.....
24	1257	1570	1885	2199	2514	2670	2827	2983	3140	3347	3455	3613	3771	3927	4084	.....	.....	.....	.....	.....	.....	.....
25	1310	1636	1965	2292	2620	2783	2946	3109	3272	3436	3601	3765	3930	4093	.....	.....	.....	.....	.....	.....	.....	.....
26	1362	1701	2043	2382	2722	2892	3063	3232	3402	3573	3744	3915	4086	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	1414	1766	2121	2474	2828	3004	3180	3356	3532	3709	3887	4064	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
28	1467	1832	2200	2567	2934	3116	3299	3481	3664	3848	4032	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
29	1519	1897	2278	2658	3038	3227	3416	3605	3794	3989	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
30	1572	1963	2358	2751	3144	3339	3535	3730	3926	4123	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
31	1624	2028	2436	2842	3248	3450	3652	3854	4056	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
32	1676	2093	2514	2933	3352	3560	3769	3977	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
33	1729	2159	2593	3025	3458	3673	3888	4103	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
34	1781	2224	2671	3116	3562	3733	3905	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
35	1834	2290	2751	3209	3668	3896	4124	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
36	1886	2355	2829	3300	3772	4006	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Pages and They Will Save You Time

and Power Machine Specifications— Between Engine and Machine Pulley

However, two conditions may present themselves which are not exactly covered by the table as it is constructed. For example:

A tractor with 365 r.p.m. and pully of 32 in. diameter must drive a silo filler at 750 r.p.m. The table gives no belt speed for 365 r.p.m. In this case proceed as follows: ssume 350 r.p.m. —giving a belt speed of 2933. Again assume 400 r.p.m.—giving a belt speed of 3352. Now 365 lies between 350 and 400. Subtract the belt speed at 350 r.p.m., 2933, from the belt speed at 400 r.p.m., 3352, giving a difference of 619. There is a difference of 50 between 350 and 400. The engine pulley has 365 r.p.m., or 15 more than 350. This difference is approximately a third of the difference between 350 and 400. Therefore, divide 619, the difference between the belt speeds at 350 and 400 r.p.m., by 3, giving 206. Add this amount to the belt speed given for 350 r.p.m., namely, 2933, giving 3139. Now look down column under 750 for that belt speed which will most nearly approximate 3139. This is found to be 3142, indicating a corresponding pulley diameter of 16 in. for the silo filler.

The other condition which may arise is where both the tractor and the driven machine have a low r.p.m. For example:

A tractor with 500 r.p.m. and a 20 in. pulley is to drive a hay press at 375 r.p.m. The table gives belt speed for 350 r.p.m. and 400 r.p.m. The given r.p.m. of the hay press, 375, is just half way between. The hay press pulley, if the press had an r.p.m. of 350, would be 29 in., and 25 in. if the r.p.m. were 400. As the given r.p.m. of the hay press is just half way between 350 and 400, so must the diameter of the pulley be half way between 25 and 29 in., or 27 in.

All the examples given are taken from actual tractor and power machine specifications, so that the same or similar combinations are likely to arise in the trade of any dealer.

There is, of course, a well-known rule for figuring such co-ordinations of pulley diameters, but it is more or less tedious work and mistakes easily can be made. There is also the old rule of three method of determining pulley co-ordinations. However, the table is easier to use than either rule, and the dealer who keeps it handy for reference always will be in a position to tell his customer what relation should exist between engine and power-driven machine pulley.

It may very well happen that on a well equipped farm there will be several power machines, no two of which should be run at the same r.p.m. As the tractor, or other power unit, is likely to be used to drive all of these machines, it must be evident that what adaptation of pulley sizes is made must be made on the various machines and not on the tractor. By using the table these easily can be determined so that the one power unit with its normal and uniform r.p.m. may be employed indifferently to drive all the power machines on the farm and enable all of them to do the best work of which they are capable.

IONS PER MINUTE
n in feet per minute)

850	875	900	925	950	975	1000	1025	1050	1075	1100	1125	1150	1200	1225	1250	1275	1300	1350	1400	1450	1500	1600	1700	1800	1900	2000
1112	1146	1178	1241	1244	1277	1311	1342	1374	1407	1440	1472	1504	1570	1603	1636	1669	1702	1776	1832	1898	1964	2094	2224	2356	2488	2622
1222	1258	1295	1329	1364	1400	1436	1467	1498	1530	1562	1613	1644	1728	1763	1798	1835	1872	1940	2006	2086	2160	2304	2444	2590	2728	2872
1354	1382	1412	1461	1508	1538	1568	1607	1646	1686	1726	1765	1804	1884	1933	1982	2011	2040	1138	2196	2296	2345	2512	2708	2824	3016	3136
1444	1487	1530	1572	1614	1657	1700	1742	1784	1827	1870	1912	1954	2040	2082	2124	2167	2210	2354	2380	2464	2550	2720	2888	3060	3228	3400
1554	1600	1646	1691	1736	1782	1828	1874	1820	1966	2012	2058	2104	2196	2231	2286	2332	2378	2468	2560	2652	2744	2928	3108	3292	3472	2656
1666	1715	1764	1813	1862	1911	1960	2009	2058	2107	2156	2205	2254	2352	2401	2450	2491	2532	2646	2732	2832	2934	3136	3332	3528	3724	3920
1776	1829	1882	1934	1986	2039	2092	2194	2296	2298	2300	2402	2404	2508	2560	2612	2664	2716	2822	2904	3030	3134	3344	3552	3764	3972	4184
1890	1946	2002	2057	2112	2168	2224	2279	2334	2390	2446	2502	2558	2770	2725	2780	2835	2890	3002	3112	3224	3336	3560	3780	4004	4224	.....
2001	2054	2118	2171	2234	2293	2352	2411	2470	2529	2588	2648	2706	2826	2879	2932	2996	3060	3166	3296	3402	3532	3768	3980	.....	.....	.....
2112	2184	2236	2298	2360	2422	2484	2546	2608	2670	2732	2795	2856	2982	3044	3106	3167	3228	3354	3476	3602	3726	3976	4224	.....	.....	.....
2226	2291	2356	2421	2486	2548	2616	2682	2748	2810	2880	2946	3012	3144	3209	3274	3340	3406	3534	3668	3798	3930	4181	.....	.....	.....	.....
2336	2404	2472	2540	2608	2675	2744	2813	2882	2952	3022	3091	3160	3300	3368	3436	3505	3574	3708	3848	3986	4124	.....	.....	.....	.....	.....
2446	2518	2590	2661	2732	2804	2876	2948	3020	3093	3166	3238	3310	3456	3527	3598	3671	3744	3884	4032	4164	.....	.....	.....	.....	.....	.....
2558	2633	2708	2783	2858	2933	3008	3083	3158	3234	3210	3385	3460	3620	3687	3762	3837	3912	4062	.....	.....	.....	.....	.....	.....	.....	.....
2668	2746	2824	2902	2980	3058	3136	3215	3294	3373	3452	3531	3610	3768	3846	3922	4000	4082	.....	.....	.....	.....	.....	.....	.....	.....	.....
2778	2860	2942	3013	3094	3171	3248	3332	3416	3501	3586	3670	3754	3924	4005	4086	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2892	2977	3062	3146	3230	3315	3400	3487	3574	3598	3742	3820	3914	4086	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3004	3092	3180	3268	3356	3444	3532	3620	3708	3797	3886	3975	4064	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3114	3205	3296	3387	3478	3569	3660	3752	3844	3936	4028	4221	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3224	3319	3414	3508	3602	3697	3792	3887	3982	4077	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3338	3436	3534	3631	3728	3826	3924	4021	4122	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3560	3664	3768	3872	3976	4080	4184	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3722	3843	3964	4085	4206	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4006	4121	4242	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Motor Age Monthly Guide to Tractors

These tables are revised and brought up to date monthly

Line No.	Manufacturer	Tractor and Model	Drawbar horse power	Belt horsepower	Number plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of engine	No. and type of cylinder	Bore and stroke	Normal R. P. M.
1		Oil Pull	12	20	3	22 x 36	2150	6682	.....	Wh.	51	Own	2 Hor.	6 x 8	560
2	Advance-Rumely Thresher Co., Laporte, Ind.	Oil Pull	16	30	4	28 x 44	2850	9600	.....	Wh.	56	Own	2 Hor.	7 x 8½	530
3		Oil Pull	20	40	5–6	32 x 52	3750	12820	.....	Wh.	64	Own	2 Hor.	8 x 10	450
4		Oil Pull	30	60	8–10	36 x 60	5900	26700	.....	Wh.	80	Own	2 Hor.	10 x 12	375
5	Allis-Chalmers Mfg. Co., Milwaukee, Wis.	Allis-Chalmers, 18-30	18	30	3–4	.....	3000	6000	$1,785	Wh.	50	Own	4 Ver.	4¾ x 6½	830
6	Appleton Mfg. Co., Batavia, Ill.	Appleton	12	20	2–3	22	2000	4900	1,650	Wh.	54	Buda	4 Ver.	4¼ x 5½	1009
7		Aultman-Taylor	15	30	4	28	2800	7500	2,300	Wh.	70	Clim.	.....	5 x 6½	900
8	Aultman-Taylor Machinery Co., Mansfield, O.											Wauk.	4 Ver.	4¾ x 6¾	
9		Aultman-Taylor	22	45	6	32	4800	13000	3,700	Wh.	70	Own	4 Hor.	5⅛ x 8	600
10		Aultman-Taylor	30	60	8–12	.....	8000	23000	4,800	Wh.	90	Own	4 Hor.	7 x 9	500
11	Automotive Corp., Toledo, Ohio	Automotive, B-B	12	25	2	30	1800	.....	.....	Wh.	40	Herc.	4 Ver.	4 x 5⅛	1000
12															
13															
14		Avery, 8-16	8	16	2–3	22 x 32	1800	4900	.....	Wh.	50	Own	2 Hor.	5½ x 6	600–700
15															
16		Avery, 12-25	12	25	3–4	20 x 30	2800	7500	.....	Wh.	56	Own	2 Hor.	6½ x 7	600–700
17		Avery, 14-28	14	28	3–4	24 x 36	3000	6800	.....	Wh.	60	Own	4 Hor.	4⅝ x 7	600–800
18	Avery Co., Peoria, Ill.	Avery, 18-36	18	36	4–5	24 x 36 / 28 x 45	3500	9250	.....	Wh.	65	Own	4 Hor.	5½ x 6	650–750
19															
20		Avery, 25-50	25	50	5–6	28 x 46 / 32 x 54	4800	12500	.....	Wh.	69	Own	4 Hor.	6½ x 7	600–700
21															
22		Avery, 40-80	40	80	8–10	36 x 60	7600	22000	.....	Wh.	87½	Own	4 Hor.	7¾ x 8	500–600
23	Bates Mach. & Trac. Co., Joliet, Ill.	Steel Mule	15	22	3	26–36	.....	4600	.....	Cr.	.....	Erd	4 Ver.	4¼ x 6	900
24															
25		Tracklayer, B	12	25	3	.....	2000	5100	2,600	Cr.	.....	Own	4 Ver.	4⅝ x 5¼	850
26	C. L. Best Gas Trac. Co., San Leandro, Calif.														
27		Tracklayer, A	35	60	9	.....	6500	17500	5,750	Cr.	.....	Own	4 Ver.	6½ x 3½	650
28															
29	Buckeye Mfg. Co., Anderson, Ind.	Trundaar, 10	25	40	4	.....	3750	8800	3,750	Ch. T.	.....	Wauk.	4 Ver.	5 x 6¼	900
30	Bull Tractor Co., Anderson, Ind.	Bull	12	24	2–3	26	1000	4996	1,200	.....	60	Toro	2 Hor.	5½ x 7	750
31	Burn-Oil Tractor Co., Peoria, Ill.	Burn-Oil, A	15	30	3	26	.....	5500	1,550	.....	56	Own	2 Hor.	6¾ x 7	700
32															
33	J. I. Case Plow Works Co., Racine, Wis.	Wallis, K	15	25	3	.....	2000	3560	.....	Wh.	48	Own	4 Ver.	4¼ x 5¾	850
34		Case, 10-18	10	18	2	20 x 28	1665	3400	1,200	Wh.	42	Own	4 Ver.	3⅞ x 5	1050
35	J. I. Case T. M. Co., Racine, Wis.	Case, 15-27	15	27	3	20 x 36	2500	5750	1,600	Wh.	52	Own	4 Ver.	4½ x 6	900
36		Case, 22-40	22	40	4–6	26 x 46	3428	9500	2,600	Wh.	56	Own	4 Ver.	5½ x 6¾	850
37															
38	Cleveland Trac. Co., Cleveland, Ohio.	Cletrac, H	12	20	2	24–40	1285	3300	1,585	Cr.	.....	Own	4 Ver.	3¾ x 5½	1265
39															
40	Dart Truck & Trac. Corp., Waterloo, Ia.	Blue J, T. E.	12	25	3	24	2250	4300	1,850	Wh.	42	Buda	4 Ver.	4¼ x 5½	1050
41		Blue J	15	30	3–4	28	2500	4500	2,000	Wh.	42	Buda	4 Ver.	4½ x 6	1050
42		Sandusky J	10	20	3	22	2000	4080	1,350	Wh.	48	Own	4 Ver.	4¼ x 5¼	1050
43	Dauch Mfg. Co., Sandusky, Ohio														
44		Sandusky, E	15	35	4	30	3500	7670	2,500	Wh.	56	Own	4 Ver.	5 x 6½	750
45		Leader, B	12	24	2	20	2000	5200	1,285	.....	48	Own	2 Hor.	6¼ x 6	800
46	Dayton-Dowd Co., Quincy, Ill.	Leader, C	18	36	3–4	28	4000	6500	2,495	Cr.	.....	Twin	4 Ver.	5 x 7½	750
47		Leader, CX	20	40	4–5	28	5000	6500	2,750	Cr.	.....	Doman	4 Ver.	6 x 7	750
48	Eagle Mfg Co., Appleton, Wis.	Eagle, F	12	22	2–3	24	2400	5850	1,290	Wh.	48	Own	2 Hor.	7 x 8	450
49		Eagle, F	16	30	3–4	28–30	3200	7100	1,750	Wh.	52	Own	2 Hor.	8 x 8	450
50	Electric Wheel Co., Quincy, Ill.	Allwork, C	14	28	3	28	3000	5000	.....	Wh.	48	Own	4 Ver.	5 x 6	800
51		E-B, Q	12	20	3	24	2000	6500	.....	Wh.	60	Own	4 Ver.	4¾ x 5	850
52	Emerson, Brantingham Co., Rockford, Ill.	E-B, 12-20, AA	12	20	3	24	2600	4355	.....	Wh.	54	Own	4 Ver.	4¾ x 5	900
53		E-B, 20-35	20	35	5	28	3300	9700	.....	Wh.	72	Own	4 Ver.	5¼ x 7	750
54		E-B, Reeves	40	65	8–10	44	10000	22750	.....	Wh.	90	Spec.	4 Ver.	7¼ x 9	500
55	Fageol Motors Co., Oakland, Calif.	Fageol, D	9	12	2	.....	1450	3500	1,525	.....	48	Lyc.	4 Ver.	3½ x 5	1250
56	Ford & Son, Inc., Henry, Dearborn, Mich.	Fordson	....	20	2	20–34	1800	2750	750	Wh.	42	Own	4 Ver.	4 x 5	1000
57															
58	Four-Drive Trac. Co., Big Rapids, Mich.	Fitch, 4	20	35	3–4	28–30	3200	6000	3,000	Wh.	F- 36x12 / R- 42x12	Clim.	4 Ver.	5 x 6½	850
59															
60	Frick Co., Waynesboro, Pa.	Frick	12	24	3	22–26	.....	5800	.....	Wh.	60	Erd.	4 Ver.	4 x 6	900–1000
61		Frick	15	30	3–4	26	.....	6000	.....	Wh.	60	Beaver	4 Ver.	4¾ x 6	900–1000
62	General Ordnance Co., Cedar Rapids, Ia.	G-O	14	28	8	30	.....	4200	1,485	Wh.	46	Wauk.	4 Ver.	4 ½ x5¾	1000
63	Gray Tractor Co., Minneapolis, Minn.	Gray	18	36	4	.....	2700	6185	.....	.....	54	Wauk.	4 Ver.	4¾ x 6¾	850
64	Hart-Parr Co., Charles City, Ia.	Hart-Parr, 30	....	30	3	28	3000	5570	1,395	Wh.	52	Own	2 Hor.	6½ x 7	750
65															
66	Holt Mfg. Co., Peoria, Ill.	Caterpillar, 5-Ton	25	40	4	32–52	3100	9400	.....	Cr.	.....	Own	4 Ver.	4¾ x 6	1050
67		Caterpillar, 10-Ton	40	60	6	40–60	5000	19000	.....	Cr.	.....	Own	4 Ver.	6½ x 7	700
68	Huber Mfg. Co., Marion, Ohio	Huber, 12-25	12	25	3	24 x 42	2400	5000	.....	Wh.	60	Wauk.	4 Ver.	4½ x 5¾	1000
69	Illinois Tractor Co., Bloomington, Ill.	Illinois, C	18	30	4	24–28	3500	5200	2,375	Wh.	54	Clim.	4 Ver.	5 x 6½	800
70		International	8	16	2	.....	1350	3600	.....	Wh.	40	Own	4 Ver.	4¼ x 5	1000
71	International Harvester Co., Chicago.	Titan	10	20	3	.....	1800	5710	.....	Wh.	54	Own	2 Hor.	6½ x 8	575
72		International	15	30	4	.....	2500	8990	.....	Wh.	66	Own	4 Hor.	5¼ x 8	575
73	J. T. Tractor Co., Cleveland, Ohio.	J. T., N	16	40	3	30	3200	6500	2,800	Cr.	.....	Chief	4 Ver.	4¾ x 6	1000
74	Kardell Trac. & Tr. Co., St. Louis, Mo.	Kardell Utility	10	20	2	.....	.....	3500	.....	.....	.....	Wis.	4 Ver.	4 x 5	.....

and Their Technical Specifications

Tractor specifications appear the last issue of each month

Line No.	Fuel	Make and size of carburetor	Make of air cleaner	Make of magneto	Make of clutch	Make of gearset	Type of gearset	Make of radiator	Make of bearings in transmission	Make of bearings in front axle	Make of bearings in rear axle	Belt pulley diameter	Belt pulley R. P. M.	Belt Speed F. P. M.	Speeds forward	Speed range M. P. H.	Recommended plowing speed	Final Drive	Drive	Furrow wheel	Line No.
1	K-D	2¼-Own	Donal.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	19	500	2790	2	2.1-3.26	2.1	B. G.	Op.	No	1
2	K-D	2½-Own	Donal.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	23	530	3190	2	2.1-3	2.1	G. B.	Op.	No	2
3	K-D	2¾-Own	Donal.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	26	450	3060	2	2-3.2	2	B. G.	Op.	No	3
4	K-D	3¼-Own	None	Bosch	Own	Own	Sl. G.	Own	Own	Own	Own	36	375	3540	1	1.9	1.9	B. G.	Op.	No	4
5	G-K	1½-King	Ben.	Opt.	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	15	830	3200	2	2.3-2.8	2.8	.....	.....	Yes	5
6	G-K	1¼-Scheb.	Ben.	Bosch	B. & B.	Nutt	Sl. G.	Perfex	Hyatt	Own	Hyatt	7½	825	2600	2	2¼-3½	.....	I. G.	.....	Yes	6
7	G-K-D	1⅜-King.	Ben.	Eise.	Own	Own	Sl. G.	Hooven	Hyatt	Own	Hyatt	20	450	2400	1	2.2-2.49	2.5	I. G.	.....	Yes	7
8																					8
9	G-K-D	2 -King.	.....	Eise.	Own	Own	Sl. G.	Own	Own	Own	Own	20	600	3150	.....	1-2.93	2.13	B. G.	.....	No	9
10	G-K-D	2½-King.	.....	Eise.	Own	Own	.....	Own	Own	Own	Own	24	500	3150	2.2	1-2.2	2.2	B. G.	.....	No	10
11	G-K	1⅜-King.	Ben.	Eise.	B. & B.	Own	Sl. G.	McCord	U. S. Gurney Hyatt	Timk.	Timk.	10	996	2600	2	2¼-4	2¼	I. G.	In.	Yes	11
12																					12
13																					13
14	G-K	1¼-King.	.....	K-W	Own	Own	C. M.	Own	.....	Own	Own	17½	600	2750	2	1¾-3	1¾	S. G.	Op.	.....	14
15	D-A																				15
16	G-K-D	1½-King.	.....	K-W	Own	Own	C. M	Own	.....	Own	Own	19½	570	2910	2	1¾-2¾	1¾	S. G.	Op.	.....	16
17	G-K-D	1¼-King.	.....	K-W	Own	Own	C. M.	Own	.....	.....	Own	16	700	2930	2	2⅛-3½	2	S. G.	Op.	.....	17
18	G-K-D	1½-King.	.....	K-W	Own	Own	C. M.	Own	.....	Own	Own	18	650	3065	2	2-3	2	S. G.	Op.	.....	18
19																					19
20	G-K-D	2-King.	.....	K-W	Own	Own	C. M.	Own	.....	Own	Own	22	500	2880	2	2-3	2	S. G.	Op.	.....	20
21																					21
22	G-K-D	2-King.	.....	K-W	Own	Own	C. M.	Own	.....	Own	Own	26	500	3400	2	1¾-2⅜	1¾	S. G.	Op.	.....	22
23	G-K-D	1¼-Ben.	Ben.	Dixie	B. & B.	Own	Sl. G.	Modine	Timk.	Timk.	T. & H.	12	725	2200	2	2.33-3.5	2.33	S. G.	.....	.....	23
24																					24
25	D	1½-Ens.	Ben.	Split.	Own	Own	Sl. G.	Own	Hyatt Timk.	.....	Hyatt	9	9000	1971	2	2¼-3	3	I. G.	.....	.....	25
26																					26
27	D	2-Ens.	Ben.	Bosch	Own	Own	Sl. G.	Own	Hyatt Timk.	.....	Timk.	16	650	2720	2	3-2	3	I. G.	.....	.....	27
28																					28
29	G-K-D	-Strom.	Own	Bosch	Hill.	Own	Sl. G.	Modine	Opt.	.....	H. & T.	....	900	2600	2	1.3-2.5	.....	S. G.	In.	.....	29
30	G-K-D	1½-King.	Donald.	K-W	.....	.....	.....	.....	.....	.....	Hyatt	12	750	.....	1	2.4-2¾	2.4	B. G.	.....	.....	30
31	K	1½-Scheb.	Ben.	K-W	Own	Own	.....	Spec.	S. K. F Hyatt	Hyatt	Hyatt	13	750	750	2	1¾-3	2¾	G.	.....	.....	31
32																					32
33	G-K-D	1¼-Ben.	Ben.	Bosch	Twin	Own	Sl. G.	Modine	Timk.	Hyatt	Timk.	18	430	.....	2	1½-3½	2½	S. G.	.....	.....	33
34	K	1⅜-King.	Own	King.	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	14¼	1050	3916	2	2¼-3½	2¼	S. G.	In.	No	34
35	K	1⅜-King.	Own	Bosch	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	16	900	3762	2	2¼-3½	2¼	S. G.	In.	No	35
36	K	2-King.	Own	Bosch	Own	Own	Sl. G.	Own	Hyatt Timk.	Timk.	Hyatt	16½	850	3669	2	1.2-3.2	2.2	S. G.	In.	No	36
37																					37
38	G-K-D	1-King.	Own	Eise. Teagle	Own	Own	.....	McCord	.....	.....	.....	8	1265	2500	1	1-3½	3½	I. G.	.....	.....	38
39																					39
40	G	1¼-King.	R. W.	Split.	Delt.	Own	Sel.	Own	Gurney	Timk.	Timk.	12	710	2600	3	1¼-6	2½	B. G.	In.	Yes	40
41	G	1¼-King.	R. W.	Split.	Delt.	Own	Sel.	Own	Gurney	Timk.	Timk.	12	710	2600	3	1¼-6	2½	B. G.	In.	Yes	41
42	G-K-D	1¼-King.	Ben.	Dixie	Own	Own	Sel.	Perfex	Hyatt N. D.	Own	Own	10	1000	2600	2	2-3	2	I. G.	.....	Yes	42
43																					43
44	G-K-D	2 -King.	Ben.	Dixie	Own	Own	Sel.	C. & P.	Own	Own	Own	15	800	2950	3	2-5½	2	I. G.	.....	No	44
45	K	1½-King.	Own	King.	Own	Own	Sel.	Eureka	Own	Own	Own	14	800	2800	2	2¼-3½	2¼	I. G.	Op.	.....	45
46	K-D	1¾-King.	Ben.	K-W	Own	Own	Sel.	Eureka	Own	Own	Own	14	750	2700	2	1.8-2½	1.8	Ch.	Op.	.....	46
47	G-K-D	1½-Holl.	Ben.	Dixie	Own	Own	Sel.	Eureka	Own	Own	Own	14	750	2700	2	1.8-2½	1.8	Ch.	Op.	.....	47
48	G-K	1½-Linga	Own	Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Own	Own	20	450	2350	2-3	1½	2	G.	.....	Yes	48
49	G-K	2 -Linga	Own	Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Own	Own	24	450	2827	2-3	1½	2	G.	.....	Yes	49
50	K	1½-King.	Ben.	King.	Own	Own	Sl. G.	Perfex	Hyatt	.....	.....	13½	800	2500	3	1⅞-3¾	2½	B. G.	.....	.....	50
51	K	1½-Ben.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Own	Own	Own	12	800	2225	3	.....	.....	B. G.	Op.	Yes	51
52	K	1½-Strom.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Hyatt	.....	.....	12	900	2800	2	2.01-2.78	.....	I. G.	In.	No	52
53	K	1½-Ben.	Ben.	K-W	Own	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	16	597	2500	2	1.81-2.33	.....	G.	Op.	No	53
54	K	2½-King.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Hyatt	Own	Hyatt	22	500	2880	1	1⅞-3.75	.....	G.	Op.	.....	54
55	G-K-D	1 -Zen.	Own	Dixie	Own	Own	C. M.	Modine	Timk.	Timk.	Timk.	8	1250	2609	1	¾-3	2⅓	S. G.	.....	.....	55
56	K	-Own	Own	Own	Own	Own	C. M.	Own	Gurney S. R. B.	Timk.	Gurney S. R. B.	9½	1000	2480	3	1-8	2¾	Worm	In.	.....	56
57																					57
58	K	1½-King.	Ben.	Dixie	B. & B.	Cotta	Ind. Cl.	Spirex	Timk.	Timk.	Timk.	14	650	2275	3	¾-4	2½	F. Bevel R. Worm	.....	No	58
59																					59
60	K	-King.	Ben.	King.	Own	Nutt.	S.	Perfex	Hyatt	Own	Own	13	900	3060	2	2.3-3.8	2½	S. G.	.....	Yes	60
61	K	-Ben.	Ben.	Dixie	Own	Nutt.	S.	Perfex	Hyatt	Own	Own	13	900	3060	2	2.3-3.8	2½	S. G.	.....	Yes	61
62	G-K	1¼-King.	Ben.	Eise.	.....	Own	C. M.	Perfex	S. K. F.	.....	.....	10	970	.....	6	1¾-3	2½	S. G.	In.	No	62
63	K	1½-Ben.	Ben.	.....	Own	Own	.....	S-J	Hyatt	.....	Hyatt	11⅜	850	2900	2	2½	2¾	Ch.	In.	Yes	63
64	K	K-Shunt	Own	K-W	Own	Own	Sl. G.	S-J	S. K. F. Hyatt	Own	.....	14	750	2750	2	2.4-3.5-2.3	3	I. G.	Op.	Yes	64
65																					65
66	G	1½-Scheb.	Donald.	Eise.	Own	Own	Sl. G.	Modine	Hyatt	Hyatt	Hyatt	12	1012	3150	3	1.5-5.7	3	G.	In.	No	66
67	G	2 -King.	Donald.	K-W	Own	Own	Sl. G.	Own	Hyatt	Hyatt	Hyatt	14	850	3120	3	1.65-4.78	3	G.	In.	No	67
68	G-K	¼-King.	Ben.	King.	Own	Own	Sel.	Perfex	G. & H.	Own	Own	13	1000	.....	2	2.43-3.75	2.43	S. G.	Op.	Yes	68
69	K	1½-Strom.	Ben.	Dixie	Twin	Foote	Sl. G.	Modine	Hyatt	Hyatt	Hyatt	14	600	2400	2	2½-3.4	2½	S. G.	In.	Yes	69
70	G-K-D	-Ens.	.....	Dixie	Own	.....	Sl. G.	B. & L.	Own	Own	.....	12¼	625	.....	.....	1¾-4.1	2¼	Ch.	.....	.....	70
71	G-K-D	-Own	.....	K-W	Own	.....	Sl. G.	.....	Own	Own	.....	18	575	.....	.....	2¼-2⅞	2⅞	Ch.	.....	.....	71
72	G-K-D	-Own	.....	K-W	Own	.....	Sl. G.	.....	Own	Own	.....	18	575	.....	.....	2¼-2⅞	2⅞	Ch.	.....	.....	72
73	K	1½-Own	Ben.	K-W	Own	Covert	Sel.	McCord	Timk.	Hyatt	Hyatt	10	1000	2600	3	1¼-5	2½	I. G.	In.	No	73
74	G	1 -Carter	Ben.	Dixie	.....	.....	.....	Eureka	.....	.....	.....	....	800	.....	2	.....	.....	.....	.....	.....	74

Motor Age Monthly Guide to Tractors

These tables are revised and brought up to date monthly

Line No.	Manufacturer	Tractor and Model	Drawbar horse power	Belt horsepower	Number plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of engine	No. and type of cylinder	Bore and stroke	Normal R. P. M.
75	Keck Gonnerman Co., Mt. Vernon, Ind.	Keck-Gonnerman, B.	12	24	3	24 x 40	2500	6500	1,500	Wh.	60	Own	2 Hor.	7¼ x 8	7 0
76		Flour City, Jr.	14	24	3	24	.....	.....	.....	.....	60	Own	4 Ver.	5 x 5	800
77	Kinnard & Sons Mfg Co., Minneapolis, Minn.	Flour City	20	35	4-5	28	.....	10000	.....	.....	72	Own	4 Ver.	5¼ x 6	800
78		Flour City	30	50	6-8	30	.....	14000	.....	.....	84	Own	4 Ver.	6¼ x 7	550-600
79		Flour City	40	70	8-10	36	.....	21000	.....	.....	96	Own	4 Ver.	7½ x 9	450-500
80	La Crosse Trac. Co , La Crosse, Wis.	La Crosse, G.	12	24	3	22	2000	4000	875	Wh.	56	Own	2 Hor.	6 x 7	750
81	Lauson, John, Mfg. Co., New Holstein, Wis.	Full Jewel	15	30	3-4	24-30	3000	6500	2,150	Wh.	54	Beav.	4 Ver.	4¾ x 6	950
82	Liberty Tractor Co., Minneapolis, Minn.	Liberty	18	32	4	30	3380	5900	2,475	Wh.	48	Clim.	4 Ver.	5 x 6½	850
83		Twin City, 12-20	12	20	3	20-24	2000	4200	.....	Wh.	50	Own	4 Ver.	4½ x 6	1000
84		Twin City, 16-30	16	30	4	24-28	3000	7800	.....	Wh.	54	Own	4 Ver.	5 x 7½	650
85	Minneapolis Steel & Machinery Co., Minneapolis	Twin City, 25-45	25	45	6	32-34	6700	16000	.....	Wh.	76	Own	4 Ver.	6¼ x 8	600
86	Minn.	Twin City, 40-65	40	65	8	40	7500	23700	.....	Wh.	84	Own	4 Ver.	7¼ x 9	535
87		Twin City, 60-90	60	90	12	40	11250	2800	.....	Wh.	84	Own	6 Ver.	7¼ x 9	535
88	Moline Plow Co., Moline, Ill.	Universal D	9	18	2	22	2100	3380	1,500	Wh.	52	Own	4 Ver.	3½ x 5	1650
89	Nichols & Shepard Co., Battle Creek, Mich.	Oil-Gas, 25-50	25	50	6	25-32x52	.....	19000	.....	Wh.	28	Own	2 Hor.	9 x 12	350-425
90		Oil-Gas, 35-70	35	70	8-10	52-64	.....	30000	.....	Wh.	32	Own	2 Hor.	10½ x 4	300-375
91	Parrett Tractor Co., Chicago Heights, Ill.	Parrett, H	12	25	3	.....	2800	5225	.....	Wh.	60	Buda	4 Ver.	4¼ x 5½	1000
92	Peoria Tractor Corp., Peoria, Ill.	Peoria, J	12	25	3	26	3000	5100	1,985	Wh.	56	Clim.	4 Ver.	5 x 6½	800
93	Pioneer Tractor Co., Winona, Minn.	Pioneer, 18-36	18	36	4	28	4000	6100	.....	.....	60	Own	4 Ver.	5½ x 6	750
94		Pioneer, 30	30	60	10	36	8000	24000	.....	.....	96	Own	4 Ver.	7 x 8	650
95	Plow Man Tractor Co., Waterloo, Ia.	Plow Man, 15-30	15	30	3-4	30	3000	5100	1,895	Wh.	60	Buda	4 Ver.	4½ x 6	1000
96	Pope Mfg. Co., Watertown, S. D.	Dakota, 4	15	27	3	24	2000	5700	1,750	Wh.	42	Doman	4 Ver.	4¾ x 6	800
97	Post Trac. Co., Cleveland	Post, D	12	20	2	.....	.....	4300	.....	Wh.	32	Wauk.	4 Ver.	4¼ x 5¾	800
98	Pt. Huron Eng. & T. Co., Pt. Huron, Mich.	Port Huron, 12-25	12	25	3	22-38	2200	5900	.....	Wh.	56	Chief	4 Ver.	4¾ x 6	900
99															
100	Reed Fdy. & Mach. Co., Kalamazoo, Mich.	One-Man	12	25	3	22-24	.....	5000	1,685	Wh.	60	Wauk.	4 Ver.	4½ x 5¾	1000
101	Rock Island Plow Co., Rock Island, Ill.	Heider, D	9	16	2	20	1500	4000	.....	Wh.	57	Wauk.	4 Ver.	4¼ x 5¾	800
102		Heider, C	12	20	3	24	2000	6000	.....	.....	57	Wauk.	4 Ver.	4½ x 6¾	750
103		Russell Junior	12	24	2	18	2000	6200	.....	2 Wh.	53	Wauk.	4 Ver.	4½ x 5¾	1000
104	Russell & Co., Massillon, Ohio.	Russell Little Boss	15	30	3	24	3000	6000	.....	2 Wh.	53	Wauk.	4 Ver.	4½ x 6¾	950
105		Russell Big Boss	20	35	4	30	4000	7600	.....	2 Wh.	60	Model	4 Ver.	5½ x 7	825
106		Russell Giant	30	60	8	40	8	24000	.....	2 Wh.	84	Own	4 Ver.	8 x 10	525
107	Shelby Trac. & Tr. Co., Shelby, O.	Shelby, C	9	18	2	20	2000	3500	.....	Wh.	42	Wauk.	4 Ver.	3¾ x 5¼	1000
108	Short Turn Tractor Co., Minneapolis, Minn.	Short Turn, D.	20	40	3	24	.....	5000	1,500	Wh.	65	.....	4 Ver.	4¾ x 6	950
109															
110															
111	Square Turn Tractor Co., Norfolk, Nebr.	Square Turn, A.	18	35	3	28	3200	7400	1,875	.....	60	Clim.	4 Ver.	5 x 6½	850
112	Stinson Trac. Co., Superior, Wis.	Stinson, 4-E	18	36	4	28-30	.....	7100	.....	Wh.	60	Beav.	4 Ver.	4¾ x 6	950
113	Topp-Stewart Trac. Co., Clintonville, Wis.	Topp-Stewart, B	20	35	3-5	.....	5000	7500	3,000	Wh.	42	Wauk.	4 Ver.	4¾ x 6¾	900
114	Turner Mfg. Co., Pt. Washington, Wis.	Simplicity	14	25	3	24	2600	4300	1,540	Wh.	54	Buda	4 Ver.	4¼ x 5½	1000
115	U. S. Trac. & Machy. Co., Menasha, Wis.	Uncle Sam, B-19	20	30	3	28	3000	4250	.....	.....	50	Beav.	4 Ver.	4¾ x 6	900
116	Vim Tractor Co., Schleisingerville, Wis.	Vim	10	20	2	20	1800	3200	1,485	Wh.	48	Wauk.	4 Ver.	3¾ x 5¼	1000
117	Waterloo Gasoline Eng. Co., Waterloo, Ia.	Waterloo Boy, N	12	25	3	.....	2000	5900	.....	Wh.	52	Own	2 Hor.	6½ x 7	750
118	Wetmore, H. A., Sioux City, Ia.	Wetmore	12	25	2	22	.....	2900	1,485	Wh.	46	Wauk.	4 Ver.	4 x 5¾	960
119	Wisconsin Farm Trac. Co., Sauk City, Wis.	Wisconsin, E	16	30	3-4	28	3500	5440	.....	Wh.	52	Clim.	4 Ver.	5 x 6½	800
120	Yuba Mfg. Co., Marysville, Calif.	Ball Thread	12	20	3	.....	3500	6750	2,945	Cr.	.....	Wauk.	4 Ver.	4½ x 6¾	700
121		Ball Thread	20	35	5-6	.....	6000	10100	4,625	Cr.	.....	Wisc.	4 Ver.	5¾ x 7	700

One- and Two-Horse Tractors

122	Allis-Chalmers Mfg. Co., Milwaukee, Wis.	General Purpose	6	12	1-16	.....	1000	2500	795	Wh.	48	Le Roi	4 Ver.	3⅛ x 4½	1000
123	Atlantic Mch. Mfg. Co., Cleveland, Ohio.	Merry Garden	.....	.....	.....	.....	250	.....	185	.....	.....	.....	.....	.....	.....
124	Avery Co., Peoria, Ill.	Avery, 5-10 B	5	10	2	22 x 32	800	2600	.....	Wh.	38	Own	4 Ver.	3 x 4	1200
125		Avery, 6-cyl	7	12	.....	22-32	.....	3150	.....	Wh.	38	Own	6 Ver.	3 x 4	1200
126	Beeman Tractor Co., Minneapolis, Minn.	Beeman, G	2	4	1-7	Non	260	550	310	Wh.	25	Own	1 Ver.	3½ x 4½	850
127	Elderfield Mechanics Co., Pt. Washington, N. Y.	Universal, 20	1	4	1	.....	250	750	450	.....	36	Own	1 Ver.	3½ x 5	1000
128	Indiana Silo Co., Anderson, Ind.	Indiana	5	10	1	.....	900	2000	.....	Wh.	50	Le Roi	4 Ver.	3⅛ x 4½	950
129	La Crosse Trac. Co., La Crosse, Wis.	La Crosse, M	7	12	1-16	18	1000	2600	750	Wh.	48	Own	2 Hor.	4 x 6	1000
130	Market Garden Trac. Co., Minneapolis, Minn.	Market	2	4½	1-7	.....	.....	550	.....	.....	24	Verac	1 Hor.	4 x 4	850
131	New Britain Mch. Co., New Britain, Conn.	New Britain, 1	.....	.....	.....	.....	.....	650	.....	Wh.	26½	Own	2 Ver.	2¾ x 4	.....
132	New Britain Mch. Co., New Britain, Conn.	New Britain, 2	.....	.....	.....	.....	.....	750	.....	Wh.	32	Own	2 Ver.	2¾ x 4	.....
133	Midwest Engine Co., Indianapolis, Ind.	Utilitor	2	4	1	.....	150-200	750	345	Wh.	24¾	Own	1 Ver.	3½ x 4½	1200
134	Scientific Farming Mchy., Minneapolis, Minn.	Princess Pat	12	25	2	24-26	2000	3500	1,750	Wh.	46	Buda	4 Ver.	4¼ x 5½	1000
135	Toro Motor Co., Minneapolis, Minn.	Toro	.....	12	2	.....	1100	2400	900	Wh.	42	Le Roi	4 Ver.	3⅛ x 4½	1200

Motor Cultivators

136	Avery Co., Peoria, Ill.	Avery, C	.....	.....	.....	.....	.....	3450	.....	Wh.	38	Own	4 Ver.	3 x 4	1200
137	Bailor Plow Mfg. Co., Atchison, Kans.	Bailor, A	6	.....	.....	.....	.....	2150	925	Wh.	44	Le Roi	4 Ver.	3⅛ x 4½	1000
138		Bailor, W	6	.....	.....	.....	.....	1800	775	Wh.	40	Le Roi	4 Ver.	3⅛ x 4½	1000
139	Detroit Culto-Tractor Corp., Detroit, Mich.	Detroit Culto, AA	9	16	2	20 x 28	1600	1800	775	Wh.	42	Own	2 Ver.	4 x 6	400
140	Emmerson-Brantingham Co., Rockford, Ill.	E-B	.....	.....	None	.....	.....	3200	.....	Wh.	42	Le Roi	4 Ver.	3⅛ x 4½	100
141	Toro Motor Co., Minneapolis, Minn.	Toro	.....	.....	.....	.....	1100	2700	.....	Wh.	42	Le Roi	4 Ver.	3⅛ x 4½	1200
142	Wilson Trac. Co., Peoria, Ill.	Wilson, J	6	12	2	.....	.....	3000	890	.....	44	Le Roi	4 Ver.	3⅛ x 4½	1000

Abbreviations: **Traction**—Wh., wheel; Cr., crawler. **Engine**—Beav., Beaver; Veer., Veerac; Herc., Hercules; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers; Auto., Automatic; Weid., Weidely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth. **Cylinders**—Ver., Vertical; Hor., horizontal; Opp., opposed. **Fuel**—G, gasoline; K, kerosene; D, distillate. **Carbureter**—Ray, Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Web., Webster; Zeph., Zephyr; Ens., Ensign; Strom., Stromberg; Till., Tillotson; Zen., Zenith; Cr., Carter. **Air-Cleaner**—Donal., Donaldson; Ben., Bennett; Hol., Holley; Len., Leonard. **Magneto**—A-K, Atwater-Kent; Sum., Sumter; Eise., Eiseman; Berl., Berling. **Clutch**—B. & B., Borg & Beck., Bier., Bierman., Mun., Muncie; Rock., Rockwood; spec., special. **Gearset**—B. & S., Brown & Sharpe; Nutt., Nuttall. **Gearset type**—Sl. G., sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetary; Sl., J. C., sliding jaw clutch. **Final drive**—S. G., spur gear; Ch., chain; D. R., double reduction; B. G., bull gear. **Drive**—Op., open; In., inclosed.

and Their Technical Specifications

Tractor specifications appear the last issue of each month

Line No.	Fuel	Make and size of carburetor	Make of air cleaner	Make of magneto	Make of clutch	Make of gearset	Type of gearset	Make of radiator	Make of bearings in transmission	Make of bearings in front axle	Make of bearings in rear axle	Belt pulley diameter	Belt pulley R. P. M.	Belt Speed F. P. M.	Speeds forward	Speed range M. P. H.	Recommended plowing speed	Final Drive	Drive	Furrow wheel	Line No.
75	K	-Scheb.	Ben.	Bosch	Own	Own	Sl. G.	Own	.....	.....	.....	11½	700	.....	3	2½-3½	3	S. G.	.....	.....	75
76	G-K	1½-Scheb.	.....	K-W	Own	Own	.....	Long	Hyatt	.....	.....	26	320	.....	2	2¼-3¼	2¼	G.	.....	.....	76
77	G-K	1½-Scheb.	.....	K-W	Own	.....	Sel.	Modine	.....	.....	.....	26	350	.....	2	2¼-3	2¼	G.	.....	.....	77
78	G-K	2 -Scheb.	.....	K-W	Own	.....	.....	Modine	.....	.....	.....	32	275	.....	1	.....	2½	G.	.....	.....	78
79	G-K	2½-Scheb.	.....	K-W	Own	.....	.....	Modine	.....	.....	.....	34	275	.....	1	.....	2½	G.	.....	.....	79
80	K	1½-King.	Ben.	.....	Own	Own	.....	Modine	Hyatt	Hyatt	Hyatt	7x11	750	2125	1	2-2¾	2½	.....	.....	Yes	80
81	K	1¼-King.	.....	Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Timk.	Hyatt	18	475	2200	2	1½-2½	2½	G.	In.	.....	81
82	G-K	1½-Strom.	Ben.	Dixie	Bier.	Own	.....	S-J	Hyatt	Own	Own	12	900	2825	2	2½-5	2½	S. G.	In.	Yes	82
83	G-K	1¼-Holl.	Ben.	Bosch	B. & B.	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	16	650	2700	2	2.2-2.9	2.9	S. G.	In.	Yes	83
84	G-K	1½-Holl.	Ben.	K-W	Own	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	17	528	2350	2	2-2.75	2¾	S. G.	In.	.....	84
85	G-K	2 -King.	.....	K-W	Own	Own	Sl. G.	Own	Own	Own	Own	20	600	3150	2	1.4-2	2	S. G.	Op.	.....	85
86	G-K	2½-King.	.....	K-W	Own	Own	Sl. G.	Own	Own	Own	Own	23	535	200	1	2	2	G.	Op.	.....	86
87	G-K	3 -King.	.....	K-W	Own	Own	Sl. G.	Own	Own	Own	Own	23	535	3200	1	2	2	S.	Op.	.....	87
88	G	1½-Holl.	Ben.	Remy	B. & B	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	9	.....	2600	1	½-3½	3½	G.	In.	Yes	88
89	K	2½-King.	.....	Wico.	Own	Own	Sl. G.	Perfex	Own	Own	Own	9x24	.....	.....	1	2-2.42	2-2.42	S. G.	.....	.....	89
90	K	3 -King.	.....	Wico.	Own	Own	Sl. G.	Perfex	Own	Own	Own	12x30	.....	.....	1	1.86	1.86	S. G.	.....	.....	90
91	K	1¼-King.	Own	Eise.	Own	Own	Sl. G.	Perfex	.....	Hyatt	Hyatt	12	1000	3141	3	1.80-4	.....	I. G.	In.	.....	91
92	K	1½-Strom.	Ben.	Eise.	Own	Nutt.	Sl. G.	Eureka	Hyatt	.....	.....	14	650	2500	2	2½-4	2½	I. G.	.....	Yes	92
93	G-K	1½-King.	Ben.	K-W	Own	Own	.....	S-J	Timk.	Timk.	Timk.	14	750	.....	3	1¾-4	2½	S. G.	.....	.....	93
94	G-K	2 -King.	Ben.	K-W	Own	Own	Sl. G.	S-J	Own	Own	Own	17½	650	.....	3	1¾-4¼	2½	.....	.....	.....	94
95	G-K	1¼-Strom.	Len.	Dixie	Twin	Foote	Sl. G.	Perfex	Hyatt	Hyatt	Hyatt	14	590	2200	2	2-3	.....	I. G.	Op.	.....	95
96	K	1¼-Linga	John.	K-W	Bier.	Own	Sl. G.	S-J	Own	Own	Own	14	800	2500	1	3	3	Ch.	.....	Yes	96
97	G-K	-King.	Ben.	Split.	Own	Own	.....	Perfex	Opt.	Timk.	Timk.	14	2500	.....	2	3-3	3	G.	.....	Yes	97
98	G-K	1⅜-King.	.....	King.	Own	Own	.....	Bremer	S. K. F.	Plain	Plain	14	650-1065	2380-3900	7	1⅞-4	2	S. G.	In.	Yes	98
99																					99
100	G-K	1¼-Ben.	Ben.	Dixie	Bier.	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	14½	2600	703	2½-3½	.....	2½	B. G.	In.	Yes	100
101	G-K	1 -King.	Ben.	Dixie	Own	.....	Fr.	Perfex	U. S.	.....	Own	12	700	2200	7	1-5	1¼	B. G.	Op.	Yes	101
102	G-K	1⅜-King.	Ben.	Dixie	Own	.....	Fr.	Perfex	U. S.	.....	Own	14	600	2200	7	1-4	2¼	B. G.	.....	Yes	102
103	K	1¼-King.	Ben.	Bosch	Own	Cotta	Sl. G.	.....	.....	.....	.....	12½	915	3000	3	1½-3¾	2¼	S. G	Op.	.....	103
104	K	1¼-King.	Ben.	Dixie	Own	Cotta	Sl. G.	.....	.....	.....	.....	12½	810	2850	3	1½-3¾	2¼	S. G.	Op.	.....	104
105	K	1½-King.	Ben.	Dixie	Own	Own	Sl. G.	.....	.....	.....	.....	12½	840	2749	2	2.4-3¾	2.4	S. G.	Op.	.....	105
106	K	2 -King.	Ben.	Bosch	Own	Own	Sl. G.	.....	.....	.....	.....	24	525	3310	2	2-4½	2	S. G.	Op.	.....	106
107	G	1 -King.	Ben.	Dixie	Full.	Full.	Sl. G.	Modine	.....	Timk.	Timk.	10	850	2200	3	1¾-4¾	2½	I. G.	In.	Yes	107
108	G-K	1½-Opt.	Opt.	Dixie	.....	Own	Sel.	Splitex	Own	Own	Own	18	950-700-490	.....	2	2-3	2½-3	I. G.	.....	Yes	108
109																					109
110																					110
111	G-K	1½-Strom.	Ben.	Dixie	.....	Own	.....	Modine	Hyatt	Hyatt	Hyatt	12	850	2669	1	2½	2½	I. G.	.....	Yes	111
112	K	1⅜-King.	.....	Dixie	Own	Own	Sl. G.	Todd	Hyatt	Hyatt	Own	12	950	2985	1	2½-3	3	S. G.	In.	Yes	112
113	G	1½-Strom.	Ben.	Eise.	B. & B.	Own	Sel.	Bremer	Hyatt	N. D.	N. D.	12	900	2600	3	1¾-4½	2½	I. G.	.....	.....	113
114	G-K	1¼-King.	Ben.	Dixie	Own	Own	.....	Perfex	Hyatt	Own	Own	14	600	600	2-2½	1¾-3	2½	.....	.....	Yes	114
115	K	1½-Ben.	Ben.	Dixie	Twin	Nutt.	Sl. G.	Perfex	Timk.	Timk.	Timk.	11	900	2600	2.6-3.8	2-4	2.6	S. G.	In.	Yes	115
116	G-K	-Ben.	Ben.	Simms	B. & B.	.....	Sl. G.	.....	.....	Gurney	Hyatt	9	1000	2300	2	2½-5	2½	I. G.	.....	Yes	116
117	K	1½-Scheb.	.....	Dixie	Own	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	14	750	2750	2¼-3	2¼-3	2¼-3	S. G.	In.	Yes	117
118	G	1¼-King.	.....	Dixie	Full.	Fuller	Sl. G.	Ideal	.....	.....	Timk.	12	900	.....	3	2-5	3	I. G.	In.	Yes	118
119	K	1½-Strom.	Ben.	Eise.	B. & B.	Foote	Sl. G.	Perfex	Hyatt	.....	.....	16	600	2600	2	1½-4	2⅛	S. G.	In.	.....	119
120	D	1¼-Ens.	Donald.	Bosch	B. & B.	Own	Sl. G.	Own	Hyatt	.....	Hyatt	12	700	2200	3	1.5-4	2.08	B. P.	.....	.....	120
121	D	-Strom.	Donald.	Bosch	Para.	Own	Sl. G.	Own	Hyatt	.....	Hyatt	10-14	700	1835	2	2.06-3.28	2.06	I. G.	.....	.....	121

One- and Two-Horse Tractors

122	G	⅞-King.	Ben.	.....	B. & B.	Own	Sl. G.	Own	Gurney	Own	Own	10	1000	2600	1	1½-2.4	2.4	.....	.....	Yes	122
123	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	123
124	G-K	¾-King.	.....	K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Own	12	780	2450	3	1½-4¼	2⅛	S. G.	Op.	.....	124
125	G-K	¾-King.	.....	K-W	Own	Own	Sl. G.	Own	.....	Own	Hyatt	12	780	2450	3	1½-4¼	2⅛	S. G.	Op.	.....	125
126	G	¾-King.	Donald.	Heinze	Own	Own	.....	S-J	.....	None	None	4½	850	900	1	¾-3	2	G.	.....	Yes	126
127	G	⅞-Zen.	.....	A-K	Own	Own	.....	Main	.....	.....	.....	6	1000	.....	1	1-3	2	Worm	.....	.....	127
128	K	⅞-King.	Ben.	A-K	Own	Own	Sl. G.	Cand.	.....	.....	.....	.....	1200	.....	1¼-4	.....	.....	Ch.	Op.	.....	128
129	K	1¼-King.	Ben.	.....	Own	Own	Own	Hopper	.....	Own	Own	10	1000	2600	1	1¾-2½	2½	.....	.....	Yes	129
130	G	1½-Verac	Ben	Berl.	Own	Own	Spec.	.....	.....	Timk.	.....	6	2000	.....	1	1½-2½	2½	Worm	.....	.....	130
131	G	¾-King.	.....	Dixie	.....	.....	.....	.....	.....	.....	.....	.....	1500	.....	.....	1-3	.....	I. G.	.....	.....	131
132	G	¾-King.	.....	Dixie	.....	.....	.....	.....	.....	.....	.....	.....	1500	.....	.....	1-3	.....	I. G.	.....	.....	132
133	G	¾-King.	Own	Eise.	Own	Own	.....	Modine	Fafnir	.....	.....	4½	1200	1200	1	2½	2¼	I. G.	In.	.....	133
134	K	¼-Ben.	Martain	Dixie	B. & B.	Own	Sl. G.	S-J	Hyatt	Hyatt	Hyatt	12	1000	3100	2	2½-4½	2½	I. G.	In.	Yes	134
135	G	⅞-King.	Ben	Eise.	Own	Own	Sl. G.	B. & W.	Opt.	.....	Hyatt	8	1200	2400	2	1-3½	3½	S. G.	In.	.....	135

Motor Cultivators

136	G-K	¾-King.	.....	K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Own	12	780	2450	3	1½-4¼	2⅛	S. G.	Op.	.....	136
137	G	⅞-King.	Ben.	Dixie	B. & B.	.....	.....	Perfex	.....	Hyatt	Hyatt	.....	.....	.....	2	2½-3 7-10	.....	Ch.	.....	.....	137
138	G	⅞-King.	Ben.	Dixie	B. & B.	.....	.....	Perfex	.....	Hyatt	Hyatt	.....	.....	.....	2	2½-3 7-10	.....	Ch.	.....	.....	138
139	G	1¼-Strom.	Own	Bosch	Own	Own	Sl. G.	Own	Hyatt	Own	Own	8	885	1800	2	1-3	2⅛	B. G.	In.	.....	139
140	G	-Holl.	Ben.	Dixie	Own	None	None	Perfex	Hyatt	Own	Hyatt	7⅛	995	.....	1-5	1½-3½	None	.....	.....	.....	140
141	G	⅞-King.	Ben.	E. & D.	Own	Own	Sl. G.	B. & W.	.....	.....	Hyatt	8x6	1200	2400	2	1-3½	.....	B. G.	In.	.....	141
142	G	¾-King.	Own	Eise.	B. & B.	Own	Sel.	Modine	S. K. F.	Hyatt	Hyatt	6	1000	1570	2	1.3-3.5	.....	S. G.	In.	.....	142

Abbreviations: **Traction**—Wh., wheel; Cr., crawler. **Engine**—Beav., Beaver; Veer., Veerac; Herc., Hercules; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers; Auto., Automatic; Weid., Weidely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth. **Cylinders**—Ver., Vertical; Hor., horizontal; Opp., opposed. **Fuel**—G, gasoline; K, kerosene; D, distillate. **Carbureter**—Ray, Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Web., Webster; Zeph., Zephyr; Ens., Ensignn; Strom., Stromberg; Till., Tollotson; Zen., Zenith; Cr., Carter. **Air-Cleaner**—Donal., Donaldson; Ben., Bennett; Hol., Holley. **Magneto**—A-K, Atwater-Kent; Sum., Sumter; Eise., Eiseman; Berl., Berling. **Clutch**—B. & B., Borg & Beck; Bier., Bierman; Mun., Muncie; Rock., Rockwood; spec., special. **Gearset**—B. & S., Brown & Sharpe; Nutt., Nuttall. **Gearset type**—Sl. G., sliding gear; Sel. G., selective gear;; Fr. friction; Plan., planetary; Sl., J. C., sliding jaw clutch. **Final drive**—S. G., spur gear; Ch., chain; D. R., double reduction; B. G., bull gear. **Drive**—Op., open; In., inclosed.

EDITORIAL

What the Tractor Show Means to the Dealers

THE Tractor show at Kansas City next week will mean to the tractor industry what the New York and Chicago passenger car and truck shows mean to those branches of the automotive industry. The tractor show means bringing together all that is new in power farming machinery and those who spend a week at Kansas City are bound to get an excellent perspective of what the industry is to offer for 1920.

TO potential tractor dealers or dealers already selling tractors the show offers the best possible opportunities for getting information along every line. There will be scores of accessory manufacturers and problems that have come up in the past year can be threshed out with such manufacturers and dealers will get first hand information. If a certain make of tractor has adopted a new engine for this year, the dealer has but to go to the booth of that engine and find out why it is a better engine than the one formerly used. The tractor maker can be interrogated along the same lines and be made to tell why he chose the particular engine. Problems of fuel and lubrication can be taken up with the makers of carbureting devices and with the representatives of the large oil companies. It might interest tractor dealers to know that most of our large oil companies have in their laboratories and in the field tested out nearly every make of engine used for tractors and can tell pretty well what sort of oil any particular engine should have and in what manner it will lubricate best.

NOT only should the dealers attend this show, but the service men as well. The dealer will view the great era of power farming that is just dawning from a new and greater perspective. The service man will get an idea of what a tremendous job is ahead of him to keep all this machinery in concert pitch. Having obtained this panoramic view it remains for the dealer and his service organization to formulate the plans for future sales and service. The tractor is but one phase of motorizing the farm. The truck, passenger car and farm light plant all must be woven into the great plan of power farming.

Future Use of Aluminum Alloys

WE are beginning to see the copious use of aluminum wheels, to cut down unsprung weight. Axle housings of aluminum, too, are coming in and not only are they cutting down the unsprung weight, but adding materially to the performance of the car or truck. A car with minimum unsprung weight has better acceleration, less tire wear, less bearing wear and possesses better riding qualities.

IN engines, aluminum, of course, has been used to a great extent, not only for pistons and connecting rods, but for blocks, heads, crankcases, gear case covers, etc. Some engine makers are experimenting with aluminum heads wherein the valve seats are steel inlays. Other engines are made with aluminum blocks and steel cylinder bores or sleeves. One of the new engines at the shows this year had an aluminum head with but a partial water jacket, leaving only a flat plate, so to speak, over the cylinder bores. The idea here evidently is to incorporate a hot-spot directly in the combustion chamber, probably a step in the future towards the use of fuel ever decreasing in gravity.

THERE remains little room for doubt that the next few years will be remarkable in the automotive industry as regards the extensive use of lighter metals, not only in reciprocating parts of the engine, but throughout the whole chassis. Some really remarkable things are going on in the laboratories of our makers, especially some of the parts makers, and it is not uncommon to go into some of them today and see aluminum-alloy connecting rods being fitted directly to a steel crankshaft bearing without any intervening bearing material, such as bronze or babbitt. Think what that means from the viewpoint of service on an engine so fitted.

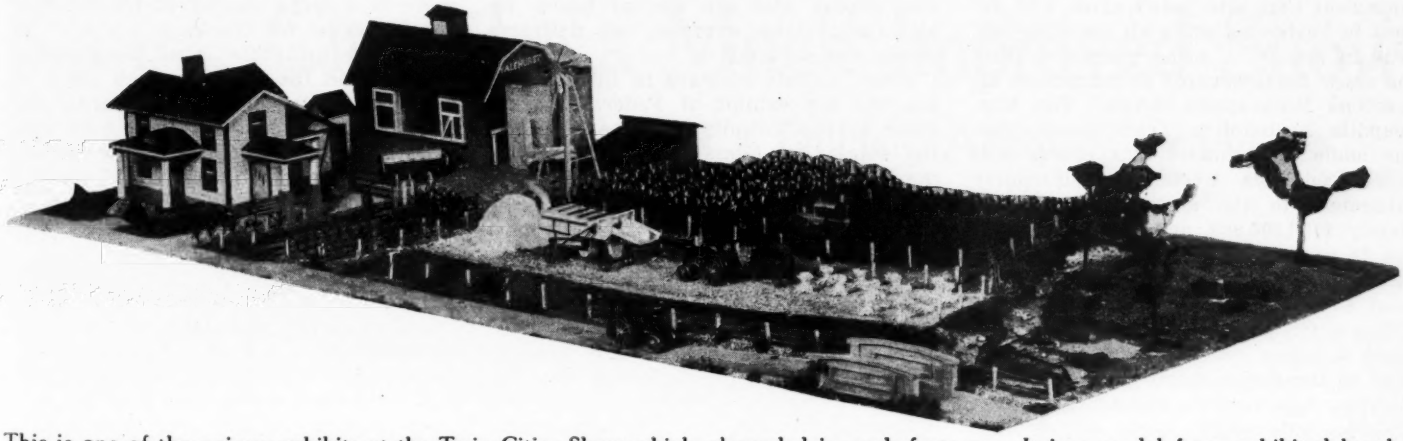
IT means easier production to begin with, easier fitting at the factory and easier service work for the dealer. A connecting rod so fitted would simply have to be replaced when worn, doing away with all pouring of babbitt or die-cast jobs. One large aluminum parts maker has run an engine so built over a long period and the last reports have it that the bearings still are standing up well under load. This is but one of the really startling things going on in the industry today.

The Necessity of Playing Fair

IN the news columns of this week's issue is an item regarding the assertion of state officials of Georgia that automobile dealers have not "played fair" with them in the matter of temporary license tags which the dealers have been privileged to issue to new purchasers of cars. The authorities declare the dealers have not lived up to the requirements of their agreement and as a result the state has lost considerable money in new licenses.

NO assertion of intentional dishonesty is even intimated by the state authorities. Rather the inclination is to attribute the misuse of the privilege to carelessness or lack of a thorough understanding of the agreement. But the abuse has become so frequent and so annoying that the authorities are considering repealing the privilege. Of course, this would mean a serious inconvenience to the motoring public and, indirectly, would hurt the dealers' business.

THIS incident brings out the necessity of dealers playing fairly with the authorities. The days of an automobile-baiting officialdom are over, the inclination at present in most places being to aid rather than hamper the automobile industry. As a rule, automobile dealers find officials only too ready and eager to co-operate with them. In return for that courtesy, the dealers should respond with prompt acquiescence with measures which will aid those officials.



This is one of the unique exhibits at the Twin Cities Show which abounded in such features. It is a model farm exhibited by the Avery Tractor Co. and was a center of interest to the crowds which attended the show

Industrial-Automotive Is Keynote of Twin Cities Show

Great Exposition at Border Line of Minneapolis-St.Paul Draws Great Crowds and Is Characteristic of the Territory

Striking Features of Twin Cities Show

¶ Farm trucks show the growth of industry in this direction.
¶ Automotivized farm equipment spells the growth of the automotive farm equipment dealers.
¶ Unique exhibits by manufacturers make this show stand out from other exhibits.
¶ Big crowds show the lively interest taken in motor car products by the public.
¶ Show is the epitome of wonderful business conditions in the territory.

MINNEAPOLIS, Feb. 4.—In every respect the thirteenth annual Twin City Automobile, Truck, Tractor and Industrial show is surpassing anything these cities ever have done in the past. Every day since the doors were opened the show has been crowded, the paid admissions running from 25,000 to 30,000 daily. This will run the total for the week far in excess of what it was last year, and that was a record breaker.

This show is different. While it is predominantly automotive, because of the three departments, passenger cars, motor trucks and tractors, nevertheless the motif is utilitarian. The displays of automotive equipment are not, for the most part, made by the manufacturers, but by distributors. For this reason, the buying element is large and the purpose of every exhibit is to impress that fact upon the visitor. Lively interest was shown by the big crowds which attended this exhibition.

Broadens Industrial Scope

Also the industrial color that is given by the excessively large number of industrial displays emphasizes the utilitarian feature and gives the show a breadth and scope that no similar show in the country carries.

As a matter of fact, the Minneapolis show is the epitome of the industrial and commercial activities of the great Northwest, gathered together for the inspection of the men and the women who make such industry possible, and displayed in such beautiful surroundings as to make even a can of axle grease artistic.

Decorative Scheme Is Appropriate

The show occupies the four main floors and the basement of the Overland building on the Midway, practically on the line which separates Minneapolis and St. Paul. The basement and first floor are filled with the display of tractors and farm operative equipment. The second floor has the accessory and part of the industrial display. The third floor contains nothing but the passenger car exhibits, while the motor trucks and the rest of the industrial exhibits are on the fourth floor.

Each floor has its distinctive decorative scheme and an effort has been made to make this appropriate. For instance, the side walls on the main floor carry out a landscape idea so that the tractors appear to be in their ordained habitat. On the passenger car floor the scheme is that of an apple orchard in full bloom and the pinks of the blossoms makes an ideal background for the cars. On the industrial floor there are trellises and palings in garden green which give an out-of-door and fresh aspect to the show which is wonderfully pleasing.

Of course, the Overland building, being a warehouse, has rather low ceilings and this detracts to some extent from artistic perfection in arranging the decorations and in some instances the general effect is hurt because of this fact. This is notably the case in passenger car section, but on soon forgets this in the freshness and coziness of the surroundings.

Although the show was formally opened to the public on Saturday, it was really not entirely set until Monday. On Sunday two full trains of passenger car exhibits from the Chicago show, running on special schedule, arrived, and the cars were installed. The late arrivals completed the show and made the display of passenger cars, as far as number of companies is concerned, quite the rival of the big national shows which preceded it. The Minneapolis show is not one of manufacturers, however, but of big distributors. This puts added emphasis upon the practicality of the show as a frank effort to get business is made. Not that there is any obtrusive soliciting for business around the exhibits, in fact, there is a decided absence of that sort of thing, but the dealers of the northwest are invited to come here and to make their contracts while they are here.

No authentic figures have been given out by anyone as to the amount of business that has been done to date, but enough has been said to warrant the

statement that this year's show will exceed in business results all previous records in about the same proportion that the show itself exceeds in magniture all previous Minneapolis shows. The Minneapolis Automotive Trade Association has made an estimate that orders will be placed this week for automotive equipment to the amount of approximately $150,000,000, and that if this figure is reached it will presage a trade for this section in automotive lines of at least a half billion dollar for 1920.

The Civic and Commerce Association made a report recently which gave figures on the automotive trade for 1919 as follows: Automobiles and trucks, $190,000,000; automobile parts, $12,000,000; gasoline, oil and grease, $52,480,000; tires and tire sundries, $75,000,000; tractors, $55,000,000. It is because the Twin Cities are the center of an automotive trade of this magnitude that such a show as is being given this week is possible.

No New Cars Shown

There is, of course, nothing in the passenger car section in the way of new models or special jobs that were not displayed either at New York or Chicago, but the display is very complete as respects all the newest cars which will be on the market this year.

A special feature of the passenger car show is the large number of cut out and stripped chassis. Most of the former and some of the latter are set on jacks or horses and are electrically lighted and operated. In cut out chassis there are the Liberty, Buick, Maxwell, Oakland Six, Nash, Dort, Dodge and Cleveland Six. In stripped chassis there are the Elgin Six, Chalmers-Maxwell, Maibohm, Mercer, Essex, Dorris and Chandler. In cut out engines there are the Stutz, Mitchell, Stearns-Knight, King Eight and Grant Six.

Some of these chassis are in special show finish and glitter in white paint and shiney nickle. Notable among these latter exhibits are the Chalmers-Maxwell, the Nash and the Mercer.

One special display of a special finished Elgin Six, Scout model, is roped in and is attracting a great deal of attention. In fact, the crowds press around the special exhibits of chassis and engines and indicate a desire to acquaint themselves with the intimate details of passenger car construction. This is one of the features which emphasizes the utilitarian aspect of the whole show.

The motor truck section is attracting one of the biggest and most constant crowds. The display as a whole is a superb one and rivals in size and diversity the Chicago show. Perhaps the largest and most varied of the displays in this section is made by the H. E. Wilcox Motor Co. Nothing but the practical dominates this exhibit and the variety of motor trucks and the number of industries for which they were specially built is bewildering. One unit of the Wilcox display, a big lumber truck with a 23 ft. chassis, elevated on wooden horses to show its construction, is attracting particular attention. In the Wilcox display also are special bodies of all types; stake, express, van, delivery, dump and so forth.

Other notable displays in this section are the big exhibit of Federal trucks, made by the McNulty & Defoe Co., Inc., the display of Acme trucks put on by the Brehm-McMulen Co., Inc., and rivaling the Wilcox display in versatility and number, the display of G. M. G. trucks in charge of the Pence Automobile Co., and the display of Nash trucks.

One interested in the artistic and expeditious handling of funerals will find much to admire in the display of funeral cars, particularly the Sayers & Scoville and the Oldsmobile lines.

The development which is being made in school cars and autobuses is well brought out in the displays of such specialties made by the Oldsmobile, the Acme and others.

There are two four wheel drive trucks shown, the Winther and the Four Wheel Drive. The latter has a cut out chassis elevated, and driven electrically.

The G. N. C. also shows a cut-out truck chassis, electrically lighted and operated.

Farm Trucks Are Featured

In this section there is intense interest in the motor truck for the farmer. Farmers throng the display and every truck man here is keeping his ears open to hear what they have to say. One company, the Forry Truck & Tractor Co., showing the Independent truck, has a special farm body display which is attracting a good deal of attention from visitors. Also the application of the pneumatic tire to the farm truck is receiving a large share of attention.

Incidental to the motor truck show there is a large display of trailers and special bodies for trucks.

But after all this is an agricultural country and the crowds which come to the show are largely from the farm. Incidentally, too, Minneapolis is the distributing center of the greatest potential tractor market in the world and for this reason big crowds always will be found down among the tractors and plows.

Tractors In Special Exhibits

When tractor manufacturers want to do something in the way of special finish for a show they all turn to white. The Avery line of tractors here cuts a great white gash down one side of the first floor, while here and there are other tractors painted the same. The Hart-Parr exhibit is in white and is prominent for the reason that one of the tractors is set at an angle of 45 deg. and looms up above its competitors in consequence. A white Steel Mule on a revolving pedestal also attracts attention. One of the Toro tractors is in white as is also a Huber, a Wallis and a Russell.

Following the lead of the car manufacturers some of the tractor men are showing cut out chassis. There is one in the Case exhibit, the G-O shows one and the Wallis has one prominently displayed.

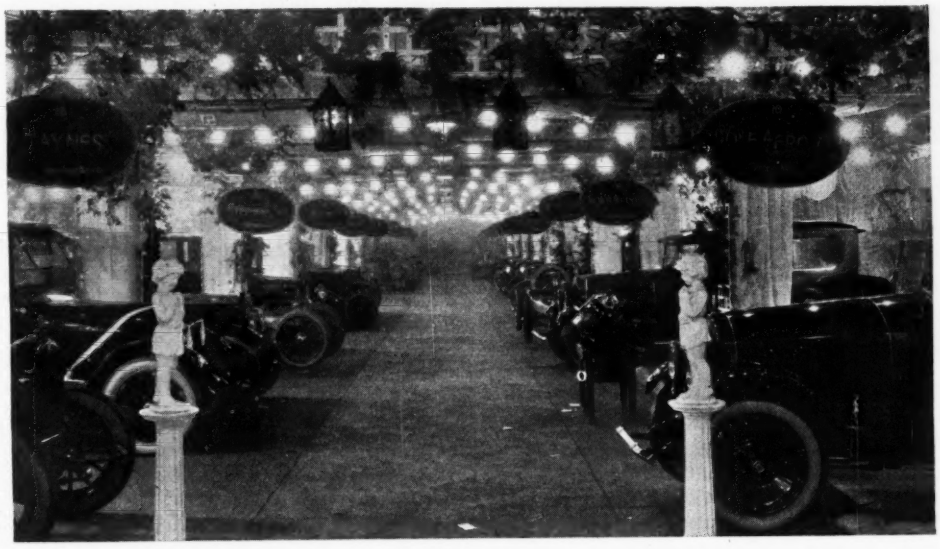
A novel exhibit which always is surrounded by a crowd is the miniature horseless farm shown by the Avery Co. This is complete in every detail and shows the application of power to all the common agricultural operations. The tractors and implements are all of toy size and the whole presents a complete picture of a modern motorized farm.

Lack of a Motor Boat Didn't Bother Him

If you have the misfortune to be flooded and no boats come to your assistance, there is no need to despair. With a few gasoline cans and half a dozen inner tubes, a most successful raft may be constructed. W. F. Bradley, who is Motor Age's representative in Europe, proved this recently when the Paris region was flooded. With his automobile boat he brought in food for the family and kept everyone happy

Kansas City Has a Much Improved Show

Missouri Metropolis at Last Gets a Building Adequate to House its Great Exhibition of Motor Cars and Trucks



A view looking down the main aisle at the Kansas City show

KANSAS CITY, Feb. 7—Kansas City is this week holding the largest motor car and truck show it has ever held. Never before has the Kansas City Motor Car Dealers' Association had a building of a size fitting for an exposition such as the town can put on. In previous years the show has been crowded into Convention Hall or the Case building, neither of which was big enough. This year the Overland building has been secured. Overall, the dimensions are such as to make 180,000 sq. ft. available on three floors. Of the 180,000 about 120,000 is used for the exhibits themselves, giving a show about twice as large as Kansas City has had in any previous year.

The big salesroom also comes in nicely as an entrance lobby. Admission booths have been erected in the place where cars are normally displayed and most of the offices have been kindly vacated by the Overland people. The building has been decorated by the Atlantic Decorating Co., of Boston, of which Ernest W. Campbell is manager. Campbell has done several shows for the Kansas City people, and gives a good effect each time.

Trucks On First Floor

When the crowd enters the building it goes first to the lowest of the three floors and finds itself among the trucks. Then it goes to the second floor, where are cars and automotive equipment, and finally to the top floor, which is all cars.

The truck show is a good display, but, as a meritorious and result-producing merchandising effort, it is not getting the desired result. People in great numbers pass along the aisles but mighty few of them stop. They just look, hurry through, and go to the floors where cars are exhibited.

This brings up once again the question of what is to be done for the truck industry. Something is needed to give it a great stimulus and to bring into the years 1920 and 1921 the business that might come normally in 1925 and 1926. The shows as held to date are not doing the trick. In some cases results are good when, as here, the trucks are in the same building with the cars, but, even at that, the result is not the big result that is needed.

In the Kansas City territory a tour might help country business, but there must be something worked out that will help the city business too.

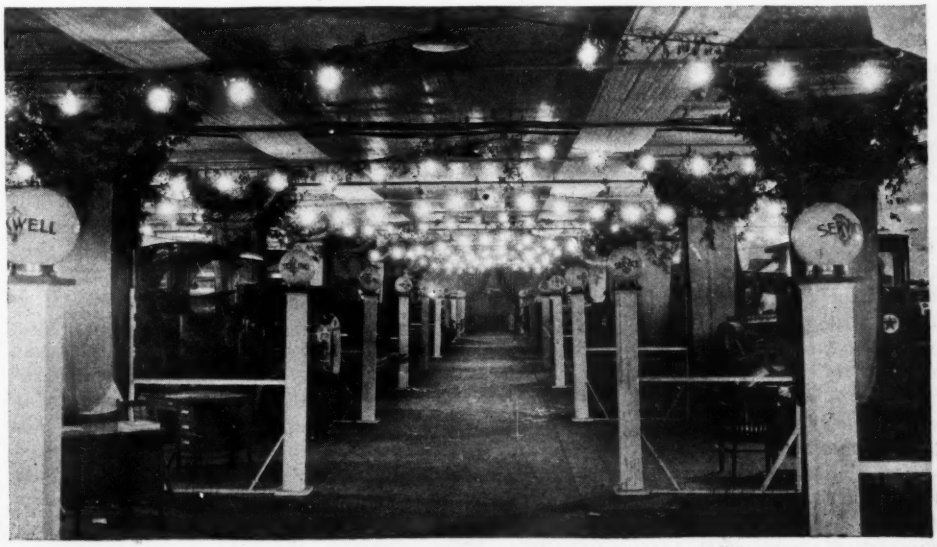
At present there are Kansas City truck dealers who have more orders than trucks, but that condition will not last indefinitely. Among the car dealers there is the usual dearth of cars that can be delivered. People are flocking to the exhibits in larger numbers than ever, all wanting cars and wanting them now. One dealer in a medium priced car is sold up until June and is still taking orders. Others are in a similar condition. Throughout the territory much the same state of affairs prevails.

The coming year should be the most prosperous Kansas City and its territory has seen, so far as the motor car business is concerned. There is a big demand, the weather is fine right now, and everything is in good condition. Money does not mean much to some of the people from the country. An oil man walked around an $8000 special body job the other evening and wrote a check for it. Some people would not ride in it on a bet, but it was just what the oil man wanted.

Attendance Is Encouraging

The attendance at the show this year is encouraging. It indicates the way the public feels about cars. In previous years the show has opened on Monday. This year it opened Saturday and kept open Sunday, and every day there were crowds.

The dealers also turned out from the territory in an encouraging manner. Wednesday noon there was a big rally dinner which was addressed by Edward S. Jordan, of the Jordan Motor Car Co., and Arthur H. Kroh.



The accessory section of the Kansas City Show

No More Distillate for California

Standard Oil Co. Discontinues Distribution of Fuel and Owners Must Now Use Gasoline or Equip Their Cars with Carbureters for Heavier Fuels

LOS ANGELES, Feb. 8—Distribution of distillate on the Pacific Coast has been discontinued by the Standard Oil Co. and thousands of motorists who have been running their cars on this fuel will be forced to use gasoline unless a carbureter is perfected to burn kerosene. Confirmation of the report that the distribution of the fuel was to be discontinued was obtained from the Los Angeles office of the Standard Oil Co.

The reason assigned is that production of crude oil is insufficient to permit of the making of distillate. For many months there has not been enough crude oil taken from the ground to meet the demand and reserve stocks have been called on to help out in the emergency. This reserve is said to be getting dangerously low and therefore it becomes necessary to make the crude produce all the gasoline possible.

Distillate is an early stage in the refinement of gasoline from crude oil and contains many of the qualities of gasoline with an ever increasing demand for gasoline and an actual inability to meet it the Standard Oil Co. is refining the crude more thoroughly to produce more gasoline. In other words, the distillate which was a by-product is being broken up in the process of refinement to produce gasoline that no by-product remains. Furthermore, some crude oils will produce distillate and others will not, and according to oil men, that which will is so short in supply that none can be wasted for making distillate but must be further refined into gasoline.

Supply Soon to be Exhausted

The Union Oil Co. has not stopped production of distillate and as the result is so swamped with orders that it cannot fill them. The evident result of this will be that its supply soon will be used up and cannot be replenished. Because of the difference in retail price, distillate being nine cents and gasoline twenty-one and one half per gallon.

Hundreds of thousands of motor vehicles on this coast have been operating on distillate. What it will mean to the oil companies to stop production of distillate and force the exclusive use of gasoline financially is inestimable.

Word was received here to-day that the attention of Attorney General Palmer has been called to the action of the Standard Oil Co. in withdrawing distillate from the market by a farmer at Calexio who protested that distillate was necessary in the operation of farm tractors because of the difference in cost compared to gasoline. The Attorney General decided to have some inquiries made and gave orders to have the matter looked into by an agent of the Department of Justice.

The inquiry is likely to develop the fact that the Interstate Commerce Commission has directed that the freight rate of distillate shall be the same as on refined oil therefore if the distillate can be "cracked" it will be more profitable to turn it into gasoline than sell it as distillate. Developments to-day indicate that protests have been made against the withdrawal of distillate by the Standard Oil Co. by river boat operators at San Francisco also.

Claim Squatters Right on Mud Holes

Texas Farmers Finding Pulling Motor Cars Out at So Much Per Pull is More Profitable Than the Old-fashioned Sort of Husbandry

WAXAHACHIE, Texas, Feb. 10—Pulling automobiles out of the mud at so much a pull has grown to be a very profitable industry in many of the rural districts of Texas during the last several months. In fact, it has proved such an easy and assured way of making big money in some communities that certain farmers with husky teams of mules have taken possession of deep mud-holes along the so-called highways and claim the first right to the place as a matter of discovery.

Rights Are Respected

These rights are generally respected by other farmers who are ever on the alert, it is said, to find a mud-hole for their own utilization as a source of profit to themselves. Not long ago a farmer with a span of mules in one of the counties in the black land belt on one of the well-traveled roads leading out of the county seat found an exceptionally fine mud-hole which for a time promised him great riches. He spent day after day by the side of the impassable spot and devoted his time to hauling automobiles through the mire with his mules. When it came to the notice of the county authorities that this enterprising farmer was making $25 to $50 a day out of the job, the monopoly was broken up by the merchants of the town employing a man and team at $2.50 a day to do the work of giving stranded automobiles a lift. This was done for the good name of the county.

In the oil producing region of central west Texas the conditions of the county highways have been deplorable for many months past, due to the unprecedented rains and the unimproved state of the roads. Pulling automobiles through the bad spots has become a well established business in that well traveled part of the state. Enormous charges are often made for this service, instances being known where wealthy oil operators who were in a hurry to reach their destination being called upon to pay as high as $25 for a fifty-foot haul of their automobile through the mud by a farmer and mule team. So exorbitant are these charges that many of the experienced travelers who are compelled by the nature of their business to make automobile trips through the country have adopted the practice of taking along with them an extra unloaded, well equipped automobile for the purpose of doing the pulling work in emergency cases.

Will Repair the Roads

For many months there has been a short, heavy muddy stretch of road on the government post highway at a point between New Braunfels and San Antonio. For days at a time almost every automobile that attempted to navigate that bad piece of road got stuck and had to call on the ever present farmers with their horse or mule teams to pull them out. In the aggregate a large amount of money was paid for this service. This stretch of roadway is now being repaired.

It is estimated that the long period of rains, together with the unusual amount of heavy motor truck and automobile travel, have done many millions of dollars damage to the highways of Texas. In some counties newly constructed road systems have been practicaly ruined and their reconstruction is necessary.

Buy Own Glass Plants

Motor Car Manufacturers Are Forced to Step to Insure Supply of Material

Fisher Body Corp., General Motors Subsidiary, is Latest to Take This Action

DETROIT, Feb. 7 — Self-preservation has forced the automobile manufacturers into the plate glass field, and there is a wild scramble to get hold of glass plants. The recent announcement of the visit of Henry Ford and son Edsel to Toledo, where they inspected Edward Ford Plate Glass Co., and the report that the Ford Motor Co. would take over the plant, was followed by the announcement that the Fisher Body Corp. had taken over three plants in Saginaw, Mich., Ottawa, Ill., and Blairsville, Penn.

The outlay for the three plants taken by the Fisher Corp. was close to $7,000,000, and the transaction was in cash. It became apparent to the Fisher Bros. two years ago that closed bodies for automobiles soon would predominate. The matter of glass was the first limited feature in connection with closed body building. The fuel shortage, closing many of the glass plants, awakened the automobile industry to the necessity of protection in such an emergency. The Fisher Bros., whose corporation is a subsidiary of General Motors, began looking over the field several months ago, and Fred Fisher made a trip through the plate glass field.

His investigation resulted in the negotiation for the three plants, the Saginaw Plate Glass Co., the Columbia Plate Glass Co. at Blairsville, and the Federal Plate Glass Co. at Ottawa combined to give the Fisher corporation an output of 12,000,000 ft. of glass each year, insuring the corporation an adequate source of supply and eliminating fear of another shortage. Possession of the Saginaw and Ottawa plants was taken Feb. 4, and the Federal plant will be taken possession of within a few days.

All of the companies are being liquidated, and will be merged into the National Plate Glass Co. with executive offices and sales headquarters in Detroit. The output, while taking care of all demands of the Fisher Corporation will permit of the sale of a large quantity.

It is the purpose to double production at the Federal plant, which lends itself to big expansion by reason of the fact that the plant's sand supply is close at hand.

The Fisher Corporation is now building 600 closed bodies a day and 1000 open bodies. Production is expected to increase to 1000 and 1600 respectively by June 1. All of the larger automobile factories have searched the plate glass field seeking an available supply and two or three deals now are being negotiated.

Detroit banks are taking an active interest in the manufacturers' plan to protect their plate glass demands, and sufficient capital is available for taking care of all transactions.

TO USE TANKS TO CLEAR ROADS

Buffalo, Feb. 10—Army tanks are to be used in clearing the snow bound roads of western New York.

At the suggestion of George B. Tyler, manager of the Buffalo Ford plant, Congressman Clarence McGregor asked the war department to experiment with tanks for road clearing purposes. An order was issued to send two of the tractors from storage at Columbus, Ohio, to make the experiment. It is planned to attach snow plows to the tractors to clear the roads, some of which between the largest cities of upper New York state have been blocked now for more than a month.

War department representatives will watch the tests, which are to be made within a few days.

NEW SERVICE STATION IN DETROIT

Detroit, Feb. 7—A new service station has been erected at 79 York street, for the convenience of Chevrolet owners. The station is modern in every detail and is equipped with all possible machines and appliances to expedite repairs. It is to be operated by the Detroit Chevrolet branch.

SAXON A FOUR-CYLINDER CAR

An unfortunate error was made in our January 29 issue in which it was stated that the new Saxon car was a six-cylinder job with a bore and stroke of 3⅛ by 5 in. The new Saxon has a four-cylinder engine and its bore and stroke is 3⅜ by 5 in.

Service Meeting Popular

New York Association Draws Good Attendance for First of its Lectures

Others of Series Will Follow at Frequent Intervals—Holt is the First Speaker

NEW YORK, Feb. 8—Members of the Automotive Service Association of New York, turned out in large numbers last week to hear Henry M. Holt, service manager of the Willys-Overland, Inc., New York, discuss the subject "Routing a Job Through the Service Station."

Holt is a service manager who has made real steps in advancing the methods of service in automobiles and the interest that his description of his methods evoked was evidenced in the discussion widely participated in at the close.

Holt operates his service station on the flat rate system entirely and he points with pride at his record of more than 2200 jobs without a complaint as indication of his judgment in adopting this system. Holt firmly believes that the time and material method of charging for service is rapidly doomed to discard. He told his auditors that he had gained considerable weight since he adopted the flat rate system.

The meeting was the first of a series that is to continue during the early spring, at which men prominent in service business will be heard in discussions of service problems.

The next meeting is set for the first Tuesday in March and the announcement of the speaker and his topics will be made in a few days.

Big Gain in Motor Vehicle Licenses

More than 1,500,000 more motor vehicles were in use in the United States in 1919 than in 1918 according to a compilation made by the B. F. Goodrich Rubber Co. from figures on state registrations furnished by the various secretaries of state. The total for 1919 shows a gain of approximately 25 per cent over 1918 and is divided by states as follows:

State	1918	1919	Pct. of Increase
Alabama	46,155	62,000	34.3
Arizona	23,875	29,000	21.5
Arkansas	41,458	49,450	19.3
California	337,878	441,101	30.6
Colorado	80,000	112,135	40.2
*Connecticut	84,902	105,419	24.2
Delaware	12,955	15,006	15.8
Florida	47,059	58,263	23.8
*Georgia	99,160	134,826	36.0
*Idaho	32,282	46,852	45.1
Illinois	389,135	478,450	23.0
Indiana	227,160	277,255	22.1
Iowa	285,000	362,000	27.0
Kansas	189,592	228,326	20.4
Kentucky	65,884	87,764	33.2
Louisiana	39,760	50,000	25.8
Massachusetts	193,497	250,800	29.6
Michigan	261,527	346,218	32.4
Maine	44,572	51,334	15.2
Maryland	78,146	104,353	33.5
Mississippi	40,000	48,000	20.0
Missouri	187,646	244,167	30.1
Minnesota	203,727	258,719	27.0
Montana	51,050	59,300	16.2
Nebraska	175,370	197,300	12.5
New Hampshire	24,904	30,006	20.5
New Jersey	154,870	192,000	24.0
New Mexico	16,893	23,030	36.3
Nevada	8,160	9,305	14.0
North Dakota	71,687	72,885	01.7
New York	457,924	600,000	31.0
North Carolina	72,300	106,125	46.8
Ohio	417,400	511,500	22.5
Oklahoma	120,300	151,300	25.8
Oregon	66,607	79,762	19.8
Pennsylvania	393,972	414,485	05.2
Rhode Island	30,595	42,000	37.3
South Carolina	55,400	67,981	22.7
South Dakota	86,121	102,701	19.3
Tennessee	65,000	80,500	23.8
Texas	250,201	330,100	31.9
Utah	27,204	35,144	29.2
Virginia	72,228	94,100	30.3
Vermont	22,550	26,806	18.9
Washington	119,905	177,566	48.1
West Virginia	38,600	50,203	30.1
Wisconsin	196,844	238,360	21.1
Wyoming	16,150	21,372	32.3
	6,023,805	7,555,269	26.0

Wichita Farm Show Features Automotive Power Equipment

WICHITA, Kan., Feb. 8—Power operated farm equipment, both of the drawbar and belt driven varieties is emphasized in the Midwest Tractor and Thresher Show which opens here tomorrow. The display of threshing machines and combined harvesting and threshing machines is the largest the trade is likely to see this year. Also there is a varied display of power plows, listers and similar tools. The exhibit of disk plows is particularly comprehensive.

In all there are 100 displays of tractors, power farm machinery, motor trucks and tractor accessories. The show is in the Forum Garage, a municipally owned building 300 by 600 ft. in size.

Two floors are filled with exhibits. The ample floor space provides each exhibitor with plenty of room for an effective and attractive display. For the most part the exhibits are being made by Wichita and Kansas City branch houses.

The decorations are simple but effective consisting of bough wreathed pillars, flags and sunflowers. Only one new tractor is thus far in place, the baby Saridge, Alton, Illinois, a general purpose type machine.

PREPARE FOR DENVER SHOW

Denver, Colo., Feb. 6—Denver's automotive show, which will open March 2 at the Stockyards stadium will be one of the big surprises of the season, according to the managers. It is expected $1,500,000 worth of passenger cars will be shown.

"The Denver automotive show will be a show of surprises and an everchanging carnival," said John E. Miller, in charge of arrangements for the exhibits. "It will have things of educational value to the $15,000 car dealer as well as to the moderate-priced dealer. And we will offer a magnificent spectacle for the aesthetic and plenty of jazz for merry-makers. It will be everybody's show."

The truck exposition has become so large that an extra building had to be erected to house it.

The army of workmen preparing the stadium for the show is rapidly getting in place the mezzanine terrace, which not only will afford 11,000 more sq. ft. of floor space for passenger car exhibits, but will add to the beauty of the stadium interior when completed. Artists plan to make each accessory booth a thing of beauty.

It looks as if the 1920 exhibit will be Denver's greatest automotive exhibit.

COUNCIL BLUFFS SHOW OPENS

Council Bluffs, Iowa, Feb. 10—Council Bluffs' automobile show opened to-day to run to Feb. 14. This is not Council Bluffs' first show, but it is the first independent show which is a guaranteed success before its doors are opened.

It is the intention to make this show rank with the best of its kind in the west. It is one of the most complete exhibits in the western part of the country. Many surprises are in store for visitors. A fine program of special attractions and events is arranged and daily exhibitions in aviation will be given by Lieutenant Nielsen and Art Bluto, the latter making his famous parachute leap from the plane with Lieutenant Nielsen at the wheel. This fact was tried out quite recently for the first time and proved highly successful. The indications are for record breaking crowds throughout the week from all sections in this district.

GETTING BATTERY PROSPECT LIST

Hartford, Conn., Feb. 6—Rather a unique method of obtaining a good list of prospects was employed by a Hartford battery house during the automobile show. Cardboard trademarks of a well known battery were placed in a glass battery jar and car owners were invited to guess the exact number of cards in the jar. The guesser filled out a printed card, giving his name, address, make of car and year. The lucky guesser pulled down a $35 six-volt battery. Rather a substantial list was secured in this manner. A second guessing contest is under way with the same idea in mind. A battery will also be given the lucky guesser in this second contest.

INDIANAPOLIS PREPARING SHOW

Indianapolis, Feb. 8—Indianapolis has started to build its greatest motor car show, March 8 to 13, and even with the commodious quarters in the Manufacturers' building at the fair grounds, there does not seem room enough to take care of the exhibits, except by crowding, according to the show manager, John B. Orman.

For the first time in the history of an Indianapolis show, aircraft will be exhibited as a commercial vehicle of the air, the Indiana Aviation Co. of Kokomo having arranged space for the "Oriole," one of the Curtiss models. The directors of the association voted to permit tractors in the show this spring. For a time, it was questionable whether tractors should be a part of the Indianapolis show, but because so many automobile dealers handle tractors, it was thought best to allow a certain space for the farm tractors and power farm equipment.

Rochester Gets Big Crowds for its Annual Motor Show

ROCHESTER, Feb. 7—Thousands of people flocked to the annual automobile show which closed its doors to-day. From all viewpoints it was the largest, the most pretentious and the best of the twelve that Rochester has known. No one who has anything to do with automobiles will gainsay that.

The three buildings which house the shows were wonderful of harmonious color and light. They contained a composite showing all that was new, interesting, atractive, comfortable and useful in the product of American's giant automobile industry. The setting of the show was one that commanded an exclamation of admiration from the person who came in contact with it. From vari-colored bunting and long strings of smilax the decorators wove a fabric of beauty with which to cover the interior of the buildings.

So great was the number of passenger cars to be accommodated that it was necessary to devote to them a portion of the truck building.

An examination of the motor car exhibits revealed a number of outstanding features. First, and foremost is the feature of the national automobile season, the popular demand for enclosed cars. The demand, in fact, was so great that it was only by exerting great effort that dealers were able to secure cars to display at the show, and some of the dealers were unable to get any. Various dealers estimate the percentage of this year's call at from 60 to 90 per cent of their total.

Another outstanding feature of the show was the growing demand for light and reasonably priced cars. Attaining at once the double object of effecting quantity production and marketing a car to meet the requirements of moderate prices, a number of manufacturers offered a substantially built machine which is said to equal many heavier cars in stamina, but to embody a number of telling economics in structure, mechanism and appointments.

The number of ready buyers at the show was a source of surprise to the salesmen. Although many of the cars on display were necessarily those which were sold to Rochester people some time ago and are just now being delivered, there was still a large number of machines on the show floor that dealers sold on the spot. This was the type that the average show-buyer here sought.

A special train containing more than 250 persons arrived here from Perry on Thursday morning over the Buffalo, Rochester & Pittsburgh railroad, so eager were the country residents to see the show.

The number of complete working models at the show this year was both unusual and interesting. Nash, Cleveland and Buick displays were among those which included stock chassis equipped with working engines from which parts had been cut away.

Several new cars made their debut at this year's show. Prominent among these were the Cleveland Six, the Maibohm and the Essex. Passenger cars, however, did not monopolize the attention of show-goers. The exhibit of commercial cars proved to be an attraction for a large portion of the buyers and a steady stream flowed by each day. There was a notably large percentage of specially built trucks which were delivered to their owners to do practical service at the end of the show to-night.

TORONTO ABANDONS SHOW

Toronto, Feb. 7—Owing to the fact that the committee appointed by the Toronto Automobile Trade Association was unable to secure a suitable building for motor show purposes despite indefatigable efforts, the association has decided to abandon the idea of holding a show this winter.

It had been expected that the Armories would be available. The Ontario Motor League requested the military authorities to permit the use of the Armories for a motor show. It is known that Gen. Bickford and Gen. Gunn were favorably disposed, but the proposal was vetoed by the man higher up.

Bad Weather Holds Down Attendance at Baltimore

BALTIMORE, MD., Feb. 7—Despite weather conditions that were abnormal—hail, rain, and a small sized blizzard included—Baltimore's fourteenth annual automobile show, which closed tonight proved a success from many standpoints. The attendance, while lower than last year, when it was above 40,000, this year was between 25,000 and 30,000, and those that braved the elements to come to motordom's exhibition were made up of about 50 per cent of a buying class. The show was run by the Baltimore Automobile Dealers' association, and John C. O'Brien, general secretary of the association, was general manager of the show. Sixty-two dealers took part with more than seventy makes of cars and there were 230 passenger cars of every conceivable type, from the Ford runabout to a $15,000 Locomobile, with fine displays of Pierce-Arrow, Stutz, Marmon, Packard, Cadillac and all of the other well known lines, more than a dozen being new to the general public, in addition to more than a dozen stripped chasses and mounted motors. Among many of the exhibits the dealers arranged attractive parts exhibits.

From a purchasing standpoint the number of cars to be sold in Maryland in 1920 will depend entirely on how many cars the dealers will be able to get. Of course, there are a few isolated cases where deliveries will be made promptly. That is the view of the most conservative and best posted dealers and the outlook presages sales of between $50,000,000 and $65,000,000 in motor cars and trucks for the territory. These figures are arrived at on a basis of the estimate of dealers on the number of cars they will be able to get and also on the fact that the show crowd gave every indication that there is going to be some real buying in the medium and higher priced cars.

The show was held in the spacious Fifth Regiment Armory, with its more than 60,000 ft. of floor space, and the building being devoid of the usual obstruction of columns presented a beautiful sight. A ceiling of dark blue, with streamers of smilax and myriads of high-powered electric bulbs, contrasted strongly to the yellow and blue and gold decorations of the side walls. Lattice work effect on columns in white ivory was used to divide the booths. The only decorations permitted in the various spaces were potted plants and cut flowers. Only a few of the booths were overcrowded, the dealers contenting themselves with showing their various models to best advantage.

The methods of dealers varied to a large extent. Managers and sales managers whose factories are unable to make prompt deliveries made it plain to the folks that discussed cars with them that it would be useless to take up a lot of time for discussion and future visits by their sales staffs unless there was immediate prospect of closing, as the orders in hand and cars to be delivered did not warrant useless waste of energy.

Wichita Motor Car Show to Run the Week of Feb. 24-28

WICHITA, Kan., Feb. 7—Wichita Motor Trade Association will put on its first independent Automobile Show in the Exposition Building Feb. 24 to 28. It will reflect the tremendous development of business in the automotive industry in the Southwest territory. No expense is being spared to make it the biggest event of the year in Wichita and its trade section.

Henry B. Marks, of Chicago, is in Wichita to direct the show. Preparations are under way to open the show on time with every exhibit in place. More than seventy makes of passenger cars and thirty kinds of trucks will be shown. A complete line of accessories will occupy the second floor. The Exposition Building has 100,000 sq. ft. of space. All reservations have already been taken. Unusual enthusiasm is being manifested by dealers.

Brightness and beauty of color design will characterize the decorative scheme. The entire ceiling of the building will be a canopy of beech leaves. Large floral baskets hanging from the canopy will add a finishing touch of color to the dark green background. Booths will be equipped with decorative lamps, topped by floral baskets. A special lighting scheme with thousands of electric bulbs will be used, and the interior of the building will be as light as day.

Orchestra music and vaudeville entertainment will be offered both day and night. Not one dull minute will be allowed in the whole show.

A great deal of advertising is being done within a radius of 300 miles of Wichita, and a large attendance of laymen and dealers is expected. Directors of the Motor Association believe the show will be one of the biggest things ever handled here because of the advantages of informing the public to the commercial importance of the automobile. The board of directors is composed of some of Wichita's best known automobile dealers. There are: M. H. Schollenberger, Mark Bunker, Karl Mosbacher, John Kirkwood, Sam D. Stearns, Fred Mankoff, and Will G. Price.

MACON PLANS FOR SHOW

Atlanta, Ga., Feb. 11—The biggest and most important automobile show that has ever been held in Georgia is planned for Macon in the early spring, according to plans that are now being worked out by the Macon Chamber of Commerce. A committee has been appointed to definitely arrange the affair and plans are being made to display passenger cars, trucks, tractors and all kinds of accessories. It will be the biggest show of this kind that has ever been held in the state.

OIL FIRM TO HANDLE TIRES

Denver, Colo., Feb. 9—A tire service will be installed at all filling stations of the Altitude Oil Co. in Denver and in Boulder, Longmont, Fort Collins and Loveland. C. E. Kennedy, formerly of the Bailey-Husel Tire Co. will be in charge. He will handle Mason tires exclusively.

PANHARD EXHIBITS IN NEW YORK

New York, Feb. 8—For the first time since 1913 Panhard cars are being exhibited here. Four of the Panhard Levassor jobs are being shown in the former cafe of the Waldorf Astoria hotel. The cars arrived a few days ago from France.

During the war the factory was engaged in making cars and trucks for the army and more than 3000 of its small 16 hp. models were made for the use of army officers. A chassis of this model and three closed body types form the exhibition. They are all 1920 models.

Geo. A. Chailliey arrived here from France last month to establish agencies for the Panhard cars. No definite price has been fixed for the closed car bodies, but they will be from $10,000 to $12,000, it is understood.

New Beverly Hills Track to be Ready for Feb. 21 Race

LOS ANGELES, Feb. 10—Work on the new mile and one-quarter board speedway at Beverly Hills is being rushed ahead as rapidly as possible. The contractors have had remarkably good weather ever since construction began and they are confident that the enormous plant will be completed far enough in advance of the opening race, Feb. 21, to permit of ample practice. Indications now are that the local speedway will be the only one of its kind of equal size and importance in use during 1920 and this probably means some of the most important national events will be run here.

Five entries already have been received by the management. Cliff Durant was the first to make application. He has entered two cars. Durant is known to be at work at the Oakland factory of the Chevrolet on two cars that will come within the 182 cu. in. requirements set by the Indianapolis management for this year's event there and it may be he will give these cars their first tryout here. The other three entries are for Frontenac cars.

P. H. Greer, a prominent motor car dealer of Los Angeles is now in the East representing the speedway management in the effort to interest drivers for the Feb. 21 contest. A number of drivers are wintering here and it is expected that eighteen of the fastest cars in the country, piloted by the most skillful drivers will face the starter. The number has been limited to eighteen.

Every effort will be made to make the initial event of big league class in every way. T. E. Meyers, Chester Ricker and Odis Porter, who time the Indianapolis races, have accepted the invitation to take care of that department Feb. 21. The starter and other officials have not been announced publicly.

The race will be 225 miles and for a purse of $25,000. The A. A. A. has notified the management that this will be the first event of the new year that will count toward the selection of the year's champion driver. Durant will drive one Chevrolet Special and has not named the driver for the other. Sarles, Goodson and Thomas are named as Frontenac drivers.

OLD WINNERS AT INDIANAPOLIS

Indianapolis, Ind., Feb. 12—The five consecutive winners of the great Indianapolis races since 1913 will run races within a race in the Eighth Annual 500-mile International Sweepstakes on the Indianapolis Motor Speedway on May 31st, for a cash purse of $50,000.00, which will make the big five century grind one of the most interesting battles in American speed history, as the lure of the big purse will be so great that not one of the former winners will be able to resist the call.

In 1913 Jules Goux came from Europe with a Peugeot and captured the third annual classic with an average of 76.92 miles per hour. Rene Thomas followed him in 1914 with a Delage car winning the event at an average of 82.47.

Ralph DePalma, one of the most popular of all race pilots established a record for the 500-mile race in 1915 that has not been equaled up to this time, driving a Mercedes car for 500 miles at the rate of 89.84 miles per hour.

The year before the suspension of racing on account of the war the distance was reduced to 300 miles and this race was captured by Dario Resta driving a Peugeot which made the second victory for this make of car, the average being 83.26.

In 1919 the distance was again 500 miles and Howard Wilcox established the third winning for the Peugeot factory, his average time being 87.95 miles per hour.

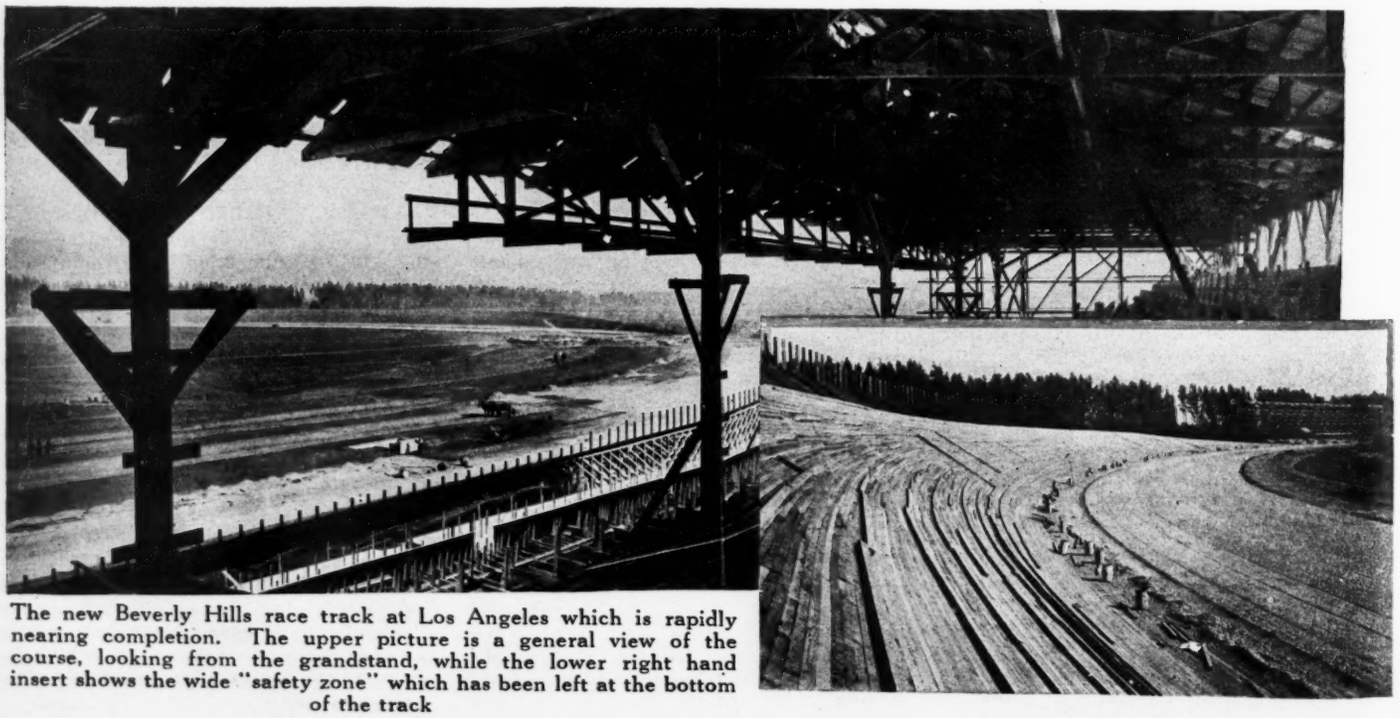
Incidentally, the only 500-mile race winners not expected to be entered in the coming event are Ray Harroun, who won the first race in 1911 at the wheel of a Marmon, and Joe Dawson, who drove a National to first place in the 1912 race. Both have retired from the racing game.

NEW SECRETARY TO AID FEDERAL HIGHWAY BILL

Washington, Feb. 8.—The Senate has confirmed the appointment of E. T. Meredith as Secretary of the Department of Agriculture, and as a result, advocates of the Federal Highway Commission are looking forward with more assurance toward the passage of this bill. Secretary Houston was opposed to the measure and was regarded as a formidable opponent to its success. Secretary Meredith, long an advocate for good roads is counted upon to aid the bill, which will provide a Federal Highway Commission.

OHIO MEN TALK GOOD ROADS

Columbus, Ohio, Feb. 11—Good roads was the chief topic of discussion at the annual meetings of three state associations, which were held in Columbus recently. The three organizations were the Ohio Good Roads Federation, the



The new Beverly Hills race track at Los Angeles which is rapidly nearing completion. The upper picture is a general view of the course, looking from the grandstand, while the lower right hand insert shows the wide "safety zone" which has been left at the bottom of the track

Ohio County Commissioners Association and the Ohio Engineering Society.

The Ohio Good Roads Federation spent the greater part of its time in discussing the various methods of using the $25,000,000 which will be available in 1920 in Ohio for road construction and maintenance. Speakers at a banquet, which was the feature of the meeting were Governor Cox, former Governor Willis, A. H. Huston, chairman of the board of trustees; R. R. Scott, Toledo, president of the association; Walter Braun, Columbus; C. H. Fouts, member of the House of Representatives and Senator Busbey, member of the senate, authors of the last good roads law. S. M. Williams, chairman of the Federal Highway Council and J. R. Marker, former Ohio Highway Commissioners, also spoke.

Officers were elected as follows: R. R. Scott, Toledo, president; W. A. Alsdorf, Columbus, secretary; T. R. Dahl, Cleveland, treasurer and A. G. Toner, Belmont county; Y. B. Jones, Columbus; Wesley Thurston, Toledo, and Harry S. Palmer, Akron, members of the board of trustees.

Registration of engineers and architects was asked by the Ohio Engineering Society at its annual convention. John J. Cox, member of the Michigan Board of Registration explained the methods used in his state. Cecil Rood, county surveyor of Lucas County spoke on "Good Roads, How to Keep Them Good." The Jones-Kleavis bill in the national congress, providing for a national board of public works was endorsed.

The Ohio County Commissioners' Association adopted a resolution for reappraisement of all real estate in the state for taxation purposes. They resolved to work with the Ohio Highway Commission in furthering good roads.

MICHIGAN CONTINUES ROAD WORK

Lansing, Mich., Feb. 9—State Highway Commissioner Rogers will continue work on the roadways of Michigan despite the increasing cost of cement, gravel and other materials. This statement was made by Deputy Commissioner L. H. Neilson in denial of a report printed in a Chicago paper to the effect that road building in Michigan had been stopped because of the exorbitant price of materials.

The department now is advertising for bids for between 300 and 350 miles of improved highways to close gaps in trunk lines at places not improved. Neilson said the department was compelled to advertise a second and even a third time for bids when they were too high and rejection of all bids in such instances is believed to have given rise to the report that work was to be stopped.

It is the plan to place Michigan in the lead in the matter of good roads and as long as there is a cent of money in the road fund there will be no let-up despite the high costs prevailing for road materials and labor, according to Commissioner Rogers. Work of clearing away the snow on roads in many sections of the state most seriously handicapped is being carried on by the department with the aid of equipment furnished by the United States government. War Department tanks and tractors are ploughing through the drifts and cutting out the roadways for traffic.

Lay Out Schedule for Tour Around Lake Huron in July

DETROIT, Feb. 9—The Michigan Pikes Association's international tour will start from Detroit July 14 and while no name has been selected the suggestion has been made that it be called "Around Lake Huron Tour." Committees in charge of the preliminary work rapidly are completing plans for the trip which will skirt the shores of lakes Erie and Ontario to Toronto then north through Muskoka to North Bay, west to Sault Ste. Marie and thence by the "Over The Top" route through Michigan to Detroit. About 300 already have signed up for the trip.

The tourists will be given a rousing send-off in Detroit, with a banquet and parade after which the party will proceed to Windsor and go into camp for the night. The trip will consume fifteen days, the tourists crossing the Canadian border three times enroute.

Designed primarily as a good road boosting jaunt the tour will cover 1,230 miles, 445 of which will be over Michigan roads and the rest in Canada. Plans contemplate the most pretentious tour yet made in the campaign for better highways.

A fleet of motor trucks will accompany the tourists and fully equipped camp outfits will be carried, the tourists spending ten of the fourteen nights under canvas. A sanitary corps, two physicians, cooks, bridge engineers and laborers will be included and everything that goes to make up a well ordered summer tour will be arranged for. Numerous pleasure trips and dinners and banquets already have been scheduled by towns and cities along the route and a brass band, professional quartet and other entertainment features will be included to help the good road propagandists. The itinerary follows:

July 14, leave Detroit; night stop, Windsor. July 15, lunch Blenheim; night stop, London.

July 16, lunch, Hamilton; night stop, Toronto. July 17, lunch, Barrie; night stop, Bracebridge. July 18, spend Sunday in Bracebridge. July 19, unch, Burkes Falls; night stop, North Bay.

July 20, lunch, Sudbury; night stop, Espanola. July 21, spend day on Spanish river. July 22, lunch, Blind River; night stop, Thessalon.

July 23, arrive Sault Ste. Marie, Ont., 10:30 a. m. and remain in camp until afternoon of July 24.

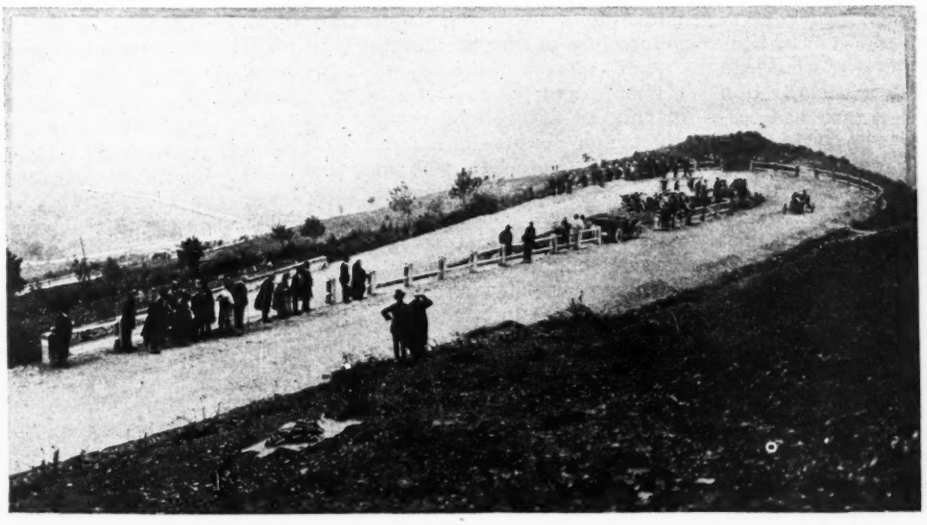
July 24, cross to Sault Ste. Marie, Mich., and spend night.

July 25, lunch, St. Ignace; night stop, Cheboygan. July 26, lunch, Gaylord; night stop, Grayling.

July 27, lunch, Harrison; night stop, Alma.

July 28, lunch, Lansing; night stop, Jackson.

Here's a Real "Hairpin" Turn



Race followers in the United States have become accustomed to hearing any turn in a race track which is less than a 90 degree turn dubbed as a "hairpin curve." Here, however, is the real thing in hairpins. It's a bird's eye view of the famous turn in the Consuma Hill course near Florence, Italy, over which numerous amateur races have been held and are to be held in the future

Deny Mexican Oil Rumor

Washington Officials Declare Price of Gasoline Here is Not Affected by Situation

Import of Southern Fuel Too Slight to Have Effect on American Producers

WASHINGTON, Feb. 9—Reports current that the Mexican oil situation is unfavorable and is affecting the price of gasoline in the United States, are regarded as exaggerated by the Bureau of Mines, Department of the Interior. This report has been based on the Mexican government's interference with the development of oil wells in Mexico, and with the appearance of salt water in several large Mexican wells, indicating that they have come to their natural end. While these facts are true, they are not regarded as important to the price of gasoline in this country.

Until this month the Mexican government has recently interfered with the development of oil wells by American companies because of the nationalization plan which President Carranza has fostered. Within the last several days, however, the drastic regulations have been temporarily suspended, and American concerns are now permitted under temporary terms, to drill new wells, relieving the Mexican situation considerably, as the new development will undoubtedly make up for the decline and exhaustion of these wells which have recently come to their natural end. The appearance of salt water within the last year in several of the largest wells, in one, for example, which has flowed a total of 100,000,000 bbls. of oil, is another important factor in Mexican production, but which will be easily offset by the new development.

Inasmuch as the total Mexican import of petroleum is less than 20 per cent of the production in the United States, and also because the Mexican oil contains comparatively small amounts of gasoline, it is not regarded as likely that the Mexican situation can have any material effect on the price of gasoline in this country, unless conditions in Mexico should become considerably more serious than they are at the present time. There would only be an effect on the price of gasoline in the United States if there should be such combination, states the Bureau of Mines, as a considerable reduction in the Mexican imports, together with a critical condition in the domestic supply of gasoline. The principal effect of the conditions in Mexico will be upon fuel oil which constitutes a large part of the Mexican crude.

That the production of oil in Mexico has not decreased despite the drastic regulations and the curtailment of production in some wells is shown by the following production table, which with the exception of 1919 was made public by the Petroleum Commission of the Mexican government.

Year	Barrels
1901	10,345
1902	40,200
1903	75,375
1904	125,625
1905	251,250
1906	502,500
1907	1,005,000
1908	3,932,900
1909	2,713,500
1910	3,634,080
1911	12,552,798
1912	16,558,215
1913	25,696,291
1914	26,235,403
1915	32,910,508
1916	40,545,712
1917	55,292,770
1918	63,828,326
1919	70,000,000 to 80,000,000

FIGHT AGAINST DRIVERS' LICENSE

Buffalo, Feb. 9—Albany was the mecca of a horde of protesting motorists last week when the New York state legislature took up a bill to license every automobile driver in the state.

A bill offered in the assembly proposed a license and fee of $2 for every person driving an automobile, regardless of the number of persons in a family driving a machine. Motorists who had just paid their increased 1920 license fees hastened to Albany and succeeded in having action on the bill postponed. It is believed a public hearing will be held before any action is taken. The storm of protest is said to have made a deep impression on the minds of the legislators.

ERROR IN ILLUSTRATION

In the MOTOR AGE issue of January 15, a photograph was captioned "The coupe body on the Nash Six has distinctive lines." The photograph was of a Mitchell.

Dealers Evade License

George Executive Declares Use of Temporary Cards is Abused

Will Seek to Abolish Permits Now Issued for Convenience of Owners

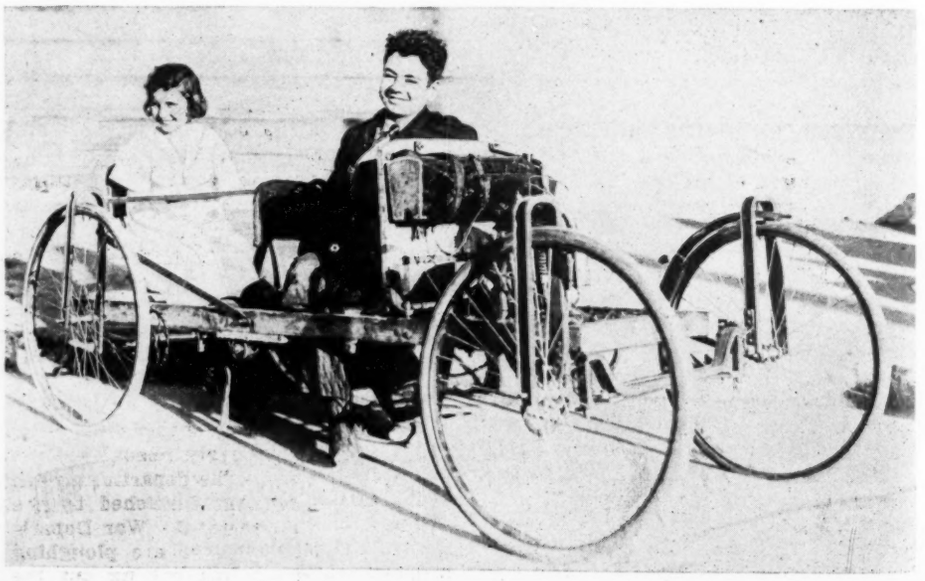
ATLANTA, Ga., Feb. 6—In order to keep the state of Georgia from being defrauded out of several thousand dollars in automobile license fees before the next meeting of the general assembly, S. G. McLendon, Secretary of State, plans to call a meeting of all automobile dealers in Atlanta to secure their co-operation in handling an unusual situation which has arisen as a result of the new motor vehicle license laws. When the assembly meets he expects to ask the legislature to repeal that section of the new law which has to do with the issuance of temporary pasteboard license tags as it is this that has brought about the present difficulty.

The law is intended solely for the convenience of purchasers of new cars. In order that they may not be deprived on the use of their cars while waiting to obtain a license, the dealer is allowed to furnish them with a pasteboard card, good for ten days only, and in no case renewable. Abuse of this privilege by some of the Atlanta automobile dealers, Mr. McLendon said, has brought on the present trouble and he has refused to issue any more of the temporary tags as a result.

At present there are more than 100,000 automobiles and trucks in the state of Georgia remaining to be licensed before March 1, 1920, which is the last day for

(*Continued on page 72*)

Builds His Own Car



Ben Hoffman, 11 years old, San Francisco, wanted an automobile and built himself one. The total cost of the machine was $49.50 and it will make 35 m.p.h.

Good Roads Men Meet

Louisville is Host to Conventions of Two Better Highways Associations

Mayor Smith Opens Meetings,—Machinery for Road Building is on Exhibition

LOUISVILLE, Ky., Feb. 10—Good roads enthusiasts and experts from all over the United States will be in Louisville all this week for the convention of the American Road Builders' Association, the American Good Roads Congress, and the Eleventh National Good Roads Show to be conducted at the armory. E. L. Powers, secretary of the association, arrived here yesterday to complete arrangements. During the program which began Monday afternoon, roadmaking authorities from all over the country will participate in the business of the convention. A number of federal experts will be here and for visitors attending the conference will be much of interest in connection with what these men have to say, because of the extensive Federal Aid road projects pending in various states.

The meeting was opened Monday afternoon at 2 o'clock with welcoming addresses by Mayor Smith and Gov. Morrow, with response by George P. Coleman, president of the American Road Builders' Association. An interesting part of the convention is provided by the program Thursday, when experts will take up, section by section, factors which will limit highway construction during the coming season. The exhibits will include more than 300 kinds of road building machinery and material filling the entire floor space of the big military building.

WHEEL FIRMS IN BIG MERGER

Lansing, Mich., Feb. 10—Motor Wheel Corp., with a capital of $10,000,000 has been formed by the merger of the Prudden Wheel Co., the Auto Wheel Co., and the Gier Pressed Steel Co. of Lansing, and the Weis & Lesh Mfg. Co. of Memphis, Tenn., and Jackson, Mich. Lansing will be the home office of the corporation and stockholders of the various companies will meet next week to ratify the merger.

Harry Harper, president of the Prudden Wheel Co., will be president of the new concern; D. L. Porter, general manager of the Auto Wheel Co., will be vice-president, and B. S. Gier, general manager of the Gier Pressed Steel Co., will be secretary-treasurer.

The merger is the direct outcome of failure to perfect a consolidation of the larger wheel and spoke manufacturing companies some time ago. The original plan included the Hayes Wheel Co. of Jackson, and the Pioneer Pole & Shaft Co, of Piqua, O. Since the failure of the original plan another merger in which the Hayes wheel and the Pioneer Pole & Shaft will figure is said to be nearing completion.

FIRE DESTROYS REPAIR STATION

Buffalo, Feb. 8—Fire on the morning of Jan. 31 destroyed sixty-five automobiles stored or being repaired in the Edward street garage here. Loss of $150,000 was occasioned by the fire. Forty of the machines were in the public garage of Benson & Stowe on the first floor. The others were in the paint shop of Hurd & Fisher on the second floor and the repair shop of Howard Chapman on the third floor. Practically all of the machines in the building were damaged beyond repair as the two upper floors collapsed, leaving little more than the shell of a building standing.

Firemen were handicapped in fighting the fire by a temperature of 10 deg. below zero and snow banks in Edward street. James Leman, night watchman in the building, discovered the fire and was trapped in an office when he attempted to extinguish the flames. He escaped by smashing a window.

Ottawa Dealers Organize

Ask for Permission to Erect Outside Filling Stations Now Prohibited

Plan for Motor Car Show in Connection With Canadian Fair in September

OTTAWA, Ont., Jan. 30—The Automotive Trade Association of Ottawa, became a definite and permanent factor in the community last week when the annual meeting of the organization took place. Permanent officers were selected and action was taken with regard to a number of important matters.

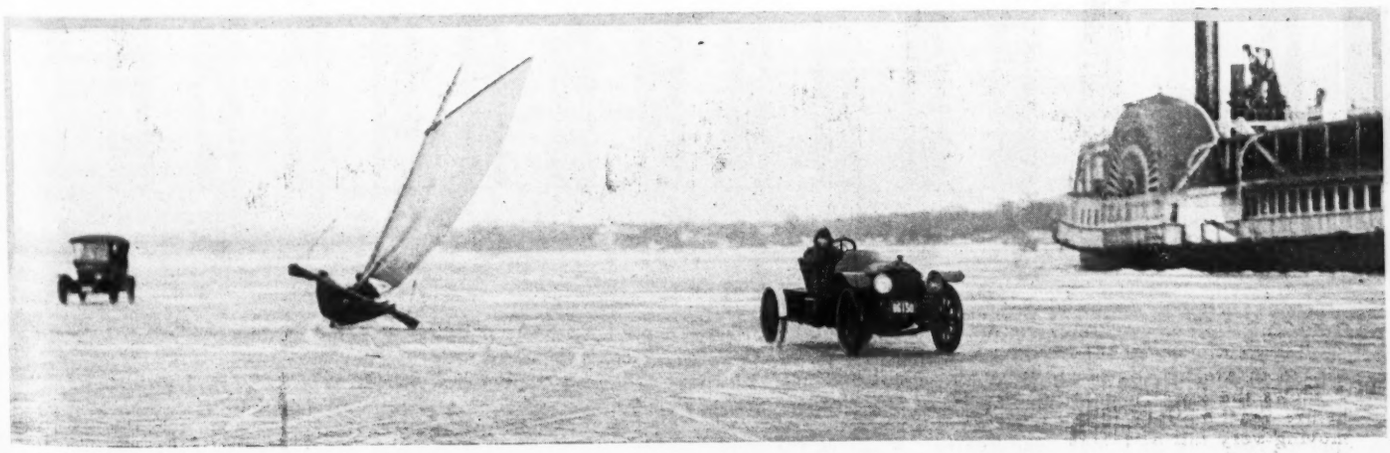
Officers were elected as follows: George Pink, president; Corliss Keyes, vice-president; W. M. Gladish, second vice-president; Thomas Baird, third vice-president; Alderman Macdonald, secretary-treasurer. W. M. Gladish was made permanent chairman to preside at general and special meetings.

It was decided in favor of a winter be decided upon at a later date. One of the features of the meeting was an illustrated address with lantern slides on the subject of "Lubrication of Automobiles," by J. J. Rappie, Canadian manager of the Tidewater Oil Sales Corporation.

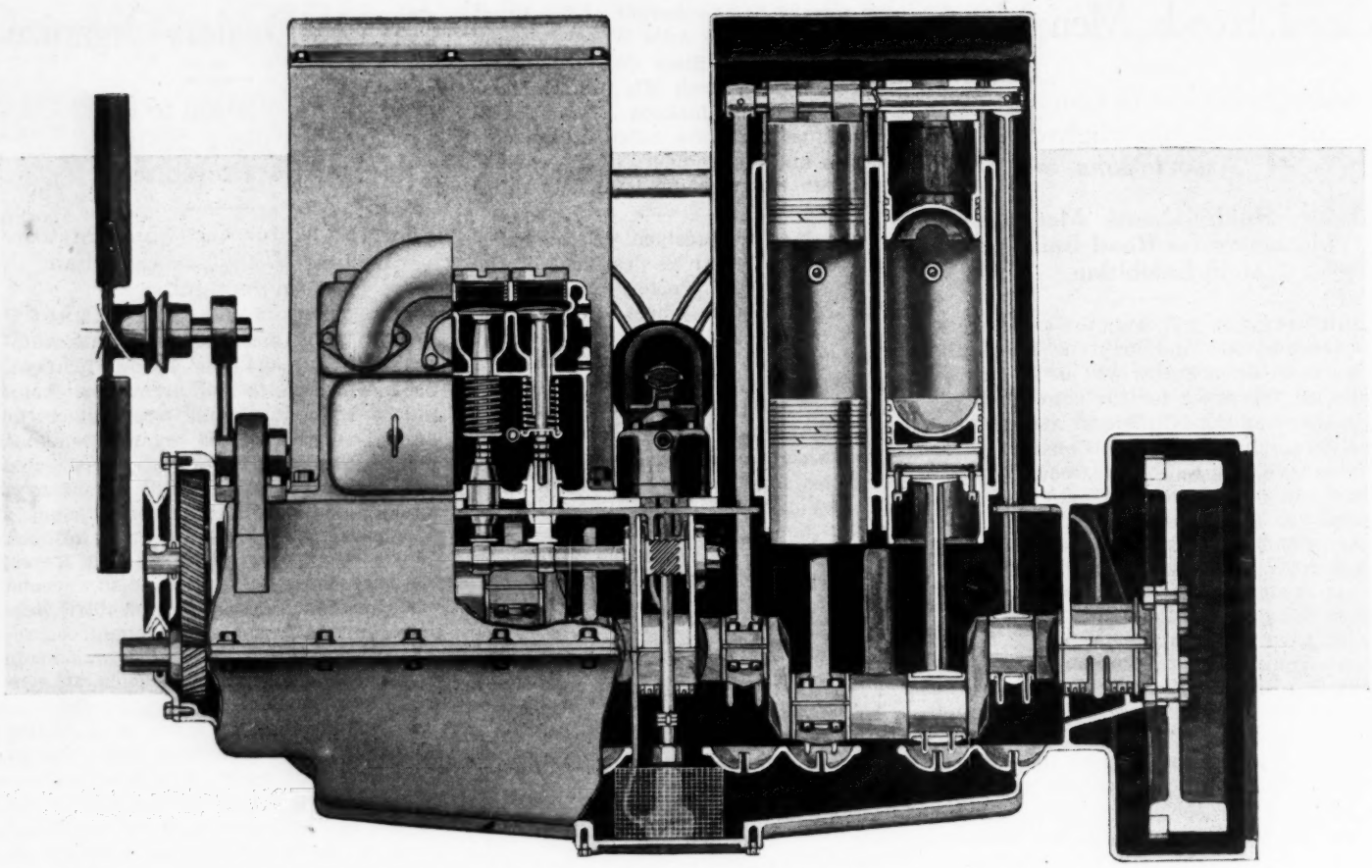
The meeting decided to leave to the new executive a move to gain permission from the city to place gasoline standards at the edge of the sidewalks in front of garages except on main congested thoroughfares. It was pointed out that the risk of fire was greatly eliminated by the use of the outside gasoline pumps.

The association is also looking ahead to the motor show in connection with the Central Canada Exhibition Fair held in September. An effort will be made to have one of the association men members elected to the directorate of the Exhibition Association in order to bring the views of the automobile men directly before the fair directors.

In Which the Motor Car Shows Speed



This remarkable picture shows an automobile crossing the finishing line just ahead of an ice boat in an unusual race on the ice at Red Bank, N. J.



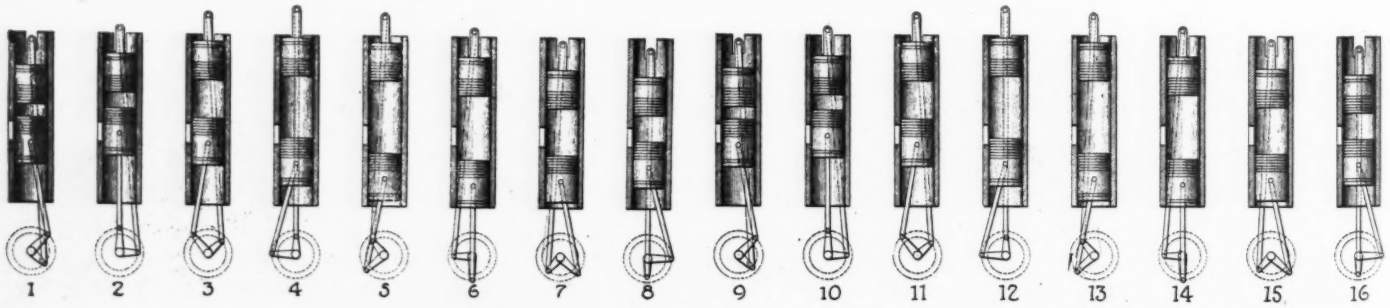
Longitudinal cross-section view of the new Jackson heavy duty, heavy fuel engine, showing the novel double piston arrangement

New Heavy Duty Heavy Fuel Engine

Jackson Engine Exhibited at Truck Show Uses Double Piston Designed for Heavy Fuel

THE Jackson petroleum engine, exhibited at the National Truck show last week here in Chicago, is a new type of internal combustion engine that operates on the four-cycle principle. It has a combustion chamber confined between two pistons, one above the other, reciprocating toward and away from each other, practically, which are controlled by their individual rods, connected to crank throws, set at 90 deg. To gain an adequate conception of the action of this peculiar arrangement one must study the diagrams which are shown herewith.

Particularly adapted to heavy grade fuel, this engine, which has four cylinders, with a bore of 4⅛ in. and an effec-



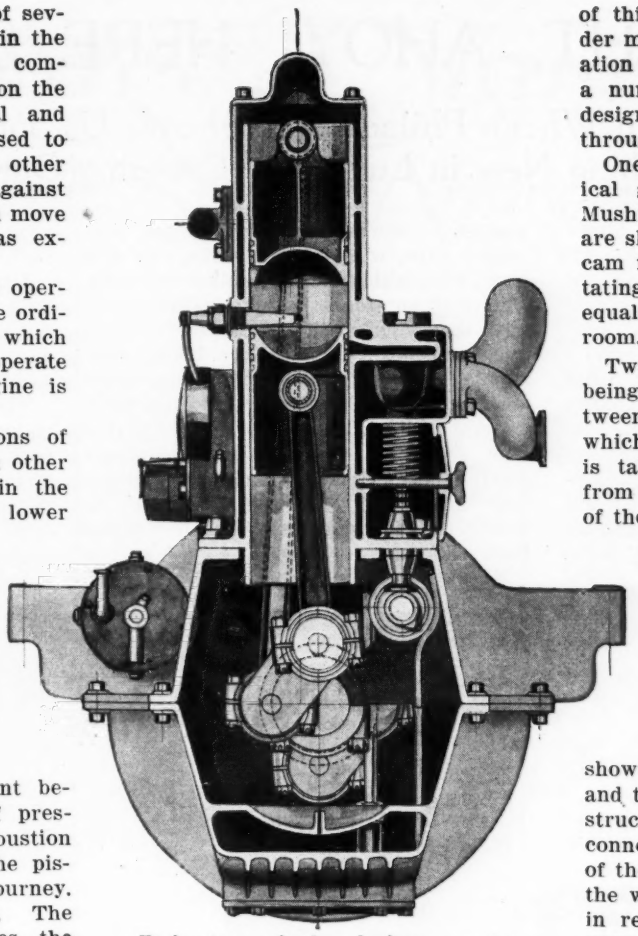
This shows the operation of the two pistons of the Jackson engine. The upper piston operates on the short throw of the crankshaft and the lower piston on the long throw. The views are from the rear of the cylinder and therefore the appearance gives on the impression that the engine operates in a direction opposite the usual rotation. Fig. 1 shows the beginning of the intake stroke. The lower piston is traveling very slowly and the upper piston is traveling rapidly; both are moving in the same direction, but the net result is that a vacuum is being produced in the chamber. 2 shows the lower piston at the point of upper dead center, while the upper piston has 90 deg. of crank travel to go before reaching its upper dead center. 4 shows the lower piston uncovering the exhaust port, with the lower piston moving very fast and the upper one slowly. 6 is the beginning of the compression stroke and 9 the completion. At this point the explosion occurs. 12 is the beginning of the exhaust and 1 the completion from this point on the cycle is repeated

tive stroke of 6½ in., makes use of several features that have long been in the process of attainment by other companies. At the moment of explosion the combustion is perfectly spherical and practically all of the metal exposed to the flame is power producing. In other words, the pressure is directly against the heads of the two pistons which move away from each other as the gas expands.

Cylinders 1 and 2, and 3 and 4 operate together as contrasted with the ordinary type of gasoline engine in which pistons 1 and 4 and 2 and 3 operate together. The action of the engine is briefly as follows:

On the intake stroke the pistons of cylinder 1 recede away from each other producing a very high vacuum in the combustion chamber. When the lower piston has reached its lower center a port is uncovered in the side which gives access to the valve chamber. At this moment the intake valve is wide open and the fuel and air which is carbureted from any ordinary carbureter pushes into the space between the two pistons.

This action is extremely violent because of the great difference of pressures that exist between the combustion chamber and the outside air. The pistons now start on their return journey. This is the compression stroke. The lower piston ascends and closes the valve port, while the upper piston descends, and the two pistons coming together practically at the same time except for the 90 deg. difference of the crank throws, compress the gas very rapidly, thus reducing the amount of air lost through leakage. With the lower piston at its highest point and the upper piston 90 deg. from its lower point, the explosion occurs. The lower piston now descends while the upper piston ascends for a period of 90 deg. crank travel when the upper piston starts on its downward stroke. At the moment that the upper piston starts on its downward journey its rate of travel is comparatively slow, because at this point it is on its dead center. The lower piston, though, is at this moment traveling at its maximum rate, and is now exerting its maximum energy on the crank pin.



End view of the Jackson engine showing the valves at the side which are in a separate chamber of their own at the time of explosion

The lower piston now uncovers the port again where it gives direct access to the valve chamber in which the exhaust valve is open. The lower piston now completes its downward stroke, thus scavenging the combustion chamber while the lower piston starts soon after and completes the exhaust stroke. The cycle is now repeated.

It will be seen that the valves in this engine are never in contact with the gas during the moment of ignition. A spark plug with an extended shell is used so that the spark is produced at the center of the spherical chamber.

So much for the principle of operation of this unique engine. The four cylinder models which are now in daily operation and which will soon be applied to a number of trucks adhere closely in design to S. A. E. standard practice throughout.

One camshaft is used, driven by a helical gear at the front of the engine. Mushroom tappets are used and these are slightly offset from the center of the cam for the purpose of producing a rotating action of the tappet to insure equal wear on the surface of the mushroom.

Two cylinder blocks are used, there being two cylinders in each block. Between the blocks is provided a space in which the magneto is placed. The drive is taken from a vertical shaft driven from the small spiral gear in the center of the camshaft and this is again geared to the magneto. The magneto is placed with its breaker box and distributor housing in a transverse position as the illustration shows, and this makes it extremely accessible.

As was mentioned before cylinders 1 and 2 and 3 and 4 operate together. The illustration shows cylinder 3 and 4 in sectional view and these are chosen to explain the construction of the upper pistons. Two long connecting rods placed on the outsides of the pair of cylinders are connected at the wrist pin end to a long shaft, which in reality is a wrist pin for these two upper pistons. This rod or wrist pin is inserted through the bushed poles in the tops of these pistons. The rods operate in a channel entirely surrounded, but having direct access to the crankcase from which an oil mist travels upward through the channel, where it lubricates these upper pistons.

One of these engines was witnessed in operation by a member of MOTOR AGE editorial staff. The engine was operating on a fuel having a Baume rating of 36 deg. measured at a room temperature of 70 deg. F. The exhaust was extremely clean and judging by its odor there was every reason to believe that complete combustion was taking place.

These engines are manufactured by the Petroleum Motors Corp. of Chicago.

TRACTOR COURSES ARE POPULAR.

Portland, Ore., Feb. 9—Much of the growing popularity of tractors among the farmers of Oregon is to be traced directly to the influence of Oregon Agricultural college, which promptly recognized the trend toward power machinery on the farm, and set out to enhance its usefulness for the farmer by giving both long and short courses in tractor selection, care, operation, adjustment and repair.

The short courses have been immensely popular. Farmers have come from the other side of the state to attend them. There are two kinds of these short courses, one lasting only a month, and repeated every month, for the benefit of farmers with very limited time to spare. This course is concentrated on care and operation of tractors, there being no time to specialize on repair work.

The other short course, of three months' duration, is devoted almost entirely to repair and adjustment problems. Four men on the instructional staff assist Professor W. J. Gilmore, head of the farm mechanics department of the college.

BAUMBACH HEADS MILWAUKEE TIRE MEN

Milwaukee, Wis., Feb. 10—Walter L. Baumbach, president of the Badger Tire & Repair Co., was elected president of the Milwaukee Tire Dealers' association at the second annual meeting. Henry O. Stenzel, head of the Milwaukee Tire & Supply Co., was elected first vice-president; H. A. Ruhnke, manager of the Federal Tire & Supply Co., is second vice-president; Lawrence Engel, of the Milwaukee Tire & Rubber Co., treasurer, and Sam A. Rowe, of the Republic Tire Co., secretary.

The organization grew out of a temporary body formed by Milwaukee tire dealers during the period of the war to facilitate enforcement of voluntary restrictions suggested by the War Economy Board in regard to hours of doing business, elimination of free service, etc.

LAND YACHT, AHOY! HERE SHE BLOWS!

In Which Philadelphia Shows Us Something New in Luxurious Camping Outfits

LAND YACHT, ahoy! Here she blows. Philadelphia and its suburbs are staring and soon the loungers on the beaches in southern resorts will be gazing, too, at the newest thing in what might be termed a Sedan-Sports car.

This Land Yacht was built to order for Dale B. Fitler, one of Philadelphia's wealthiest young sportsmen. The remarkable body with its complete equipment for hunting, fishing, general camping and touring and its luxurious appointments is on a White truck chassis of one and one-half tons. It cost, without the special extra equipment, $7,000, and the equipment cost $500. The car was designed by a regular architect, C. E. Schermerhorn, and constructed by the Dunbar Automobile Body Co. and they certainly had to go some, to live up to the specifications.

The wheelbase is 140 in. and the engine is 45 hp. The car seats easily six passengers and has provisions for converting it at once into a sleeping apartment accommodating four persons, a kitchen and dining room; a hunting lodge or a fishing hut also are prepared from it in a jiffy! The body of the car has hand-hammered aluminum panels over a skeleton ashwood frame, which is glued and securely screwed together. The wood used is carefully cured and made impervious to atmospheric changes. The color scheme is brown and gray. The body below the windowrail is a natural gray-brown and the upper is of "battle brown" with the roof and rear panels overlaid with panels of clay brown duck, eliminating marring.

The body striping, or stream-lining is of silver. The interior of the car is of clay gray alligator art leather for ceiling and sides, except around the "galley," for food storage and cooking, where the finish is satinized aluminum. The floor is lined with neutral "battleship" linoleum and the six removable seats, of nested, spring-upholstered cushion passenger type, with folding backs, are covered with alligator art leather in gray. The interior tones harmonize perfectly with the exterior. The lines of the hood agree with the lines of the body. The rear wheels are housed with hammered steel shapes, eliminating the hitherto general encroachment on the interior floor space and crown type hammered steel fenders lend balance in appearance and avoid excessive overhang, as would be the case were the tires hung from the rear.

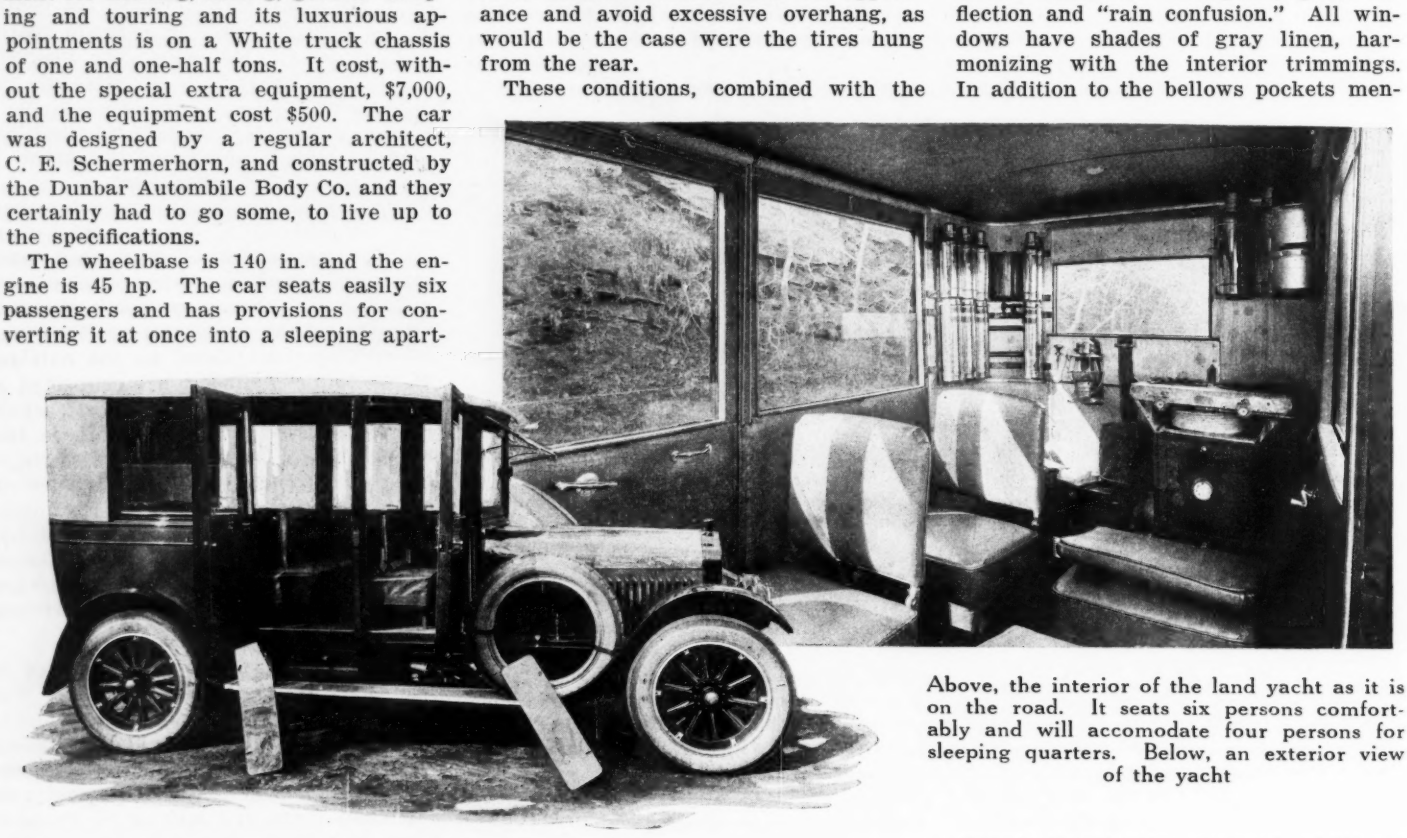
These conditions, combined with the colors selected, the body lines, the elongation of cowl and hood, the hanging of the rear gas tank and the arrangement of road and other lights create an optical illusion that makes the design of the body appear much shorter and lower than it really is. The seats mentioned are securely fastened to the floor when in use, yet easily are released and neatly nested when the interior of the car is required for sleeping, or other purposes. The car has four wide doors of novel, yet practical design, fitted with door handles, there being locking devices on the inside of three of them, for security at night, and an outside lock to the driver's seat. On the inside of each door spacious bellows type pockets are provided for storage of clothing, or other articles of baggage. All doors have polished plate glass and are equipped with noiseless and smooth window-raising devices, including the side and rear glass panels. The glass in the rear can be lowered for ventilation at night and during cooking.

Under these conditions, ample provision is made for protection from storms, for enough air when riding or sleeping and for sufficient ventilation when meals are in progress.

The windshield is of two-piece, "clear-vision" character, ingeniously provided with an awning type of hood curtain which eliminates road-glare, glass reflection and "rain confusion." All windows have shades of gray linen, harmonizing with the interior trimmings. In addition to the bellows pockets mentioned, ingeniously arranged additional clothing cache pockets have been placed between the skeleton parts of the body frame. The car is lighted with flush ceiling dome lights provided with conveniently arranged switches controlling a battery just for the purpose. There also are bullseye lights above the cowl and standard equipment head, dimmer and tail lights. Emergency fire protection is afforded in the form of two one-quart carbon tetrachloride pump-type extinguishers conveniently located for immediate use. The car has an electric self-starter. All food storage and cooking equipment are conveniently nested in the "galley" space, which is in the extreme rear of the car body and so arranged as in no manner to interfere with the sleeping paraphernalia when it is assembled after the seats have been removed and nested.

In this "galley" section is a small refrigerator box crate, which, like all other

(*Continued on page* 58)



Above, the interior of the land yacht as it is on the road. It seats six persons comfortably and will accomodate four persons for sleeping quarters. Below, an exterior view of the yacht

Garage Planning
Service Station Arrangements

MOTOR AGE is receiving many inquiries for garage plans which do not give sufficient information to permit an intelligent reply. There are certain things which should be known to lay out the proper plan for a garage, and inquiries are urged in asking for such plans to be sure to include the following information.

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

And how much of an accessory department is anticipated.

No. 180
HOPES TO STORE MANY CARS

I am contemplating the building of a one-story garage and so am seeking information regarding the plans, construction and cost of such an operation.

The specifications are: one-story brick, 100 by 100 ft., situated in the center of block accommodating from eighty to a hundred cars and a small office and accessory supply department.—Walter G. Lahm, Brooklyn, N. Y.

You are altogether too optimistic about the number of cars you can store in a space 100 ft. square. You might crowd in one hundred cars if you discard the office and leave no aisles, but a layout such as we show which has a minimum of waste space will only take care of fifty cars of average size.

If your lot is deep enough to extend the building seventy-five feet you would then be able to store 100 cars and do it with very little loss. Your width of 100 ft. is the best possible for economy of space in storage.

No. 183
LARGE SUMMER TOURIST TRADE

I expect to have a garage built on a lot 66x132 ft. and the shop shown by accompanied sketch. I wish to have a showroom for four cars and an accessories salesroom to handle a complete line of tires and accessories and with a place to put a parts department in the future.

As it will be located in a town that has a large summer tourist trade, I wish to have a small shop on the ground floor to handle small service repair jobs that can be turned out in a few hours or less. I want room to install a complete and modern set of equipment in the main repair shop on the second floor. I would expect to employ three or four men in the shop during the summer.

I want room for as many cars as possible and still make it easy to get out in a hurry from any part of the garage. I would prefer two entrances at the front and one in the rear. Would you please publish a plan to suit my needs as soon as possible.—T. Torkelson, Spirit Lake, Iowa.

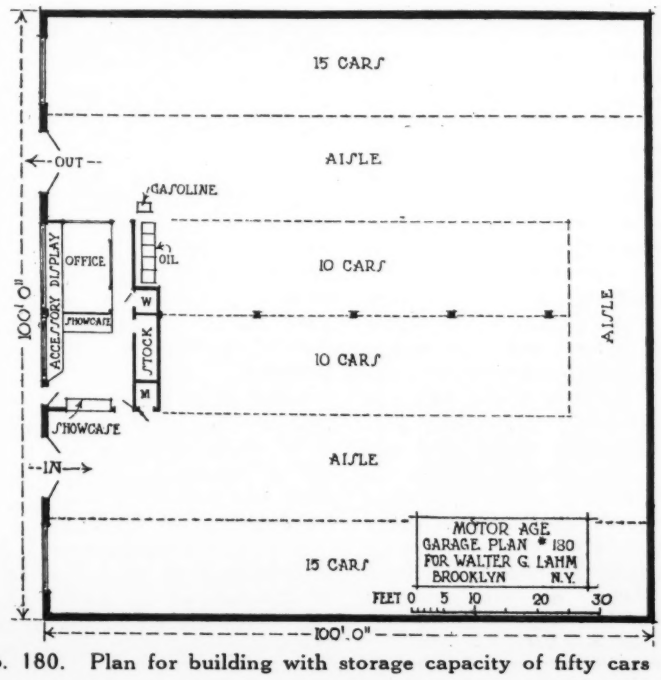
The width of your building will not allow two front entrances with an economical use of space, but the same result may be obtained by making the one entrance wide enough to allow two cars to pass.

As you probably want all the car storage space you can get on the first floor it will be advisable to move everything to to the second floor that is not directly salable or of use of transients. Consequently all the bulky accessories are moved to the second floor with parts where they are handy to the shop and from which location they can be conveyed to the accessory store by dumb waiter as they are wanted for retail trade.

To accommodate the slope of the street it would be best to establish your floor level where the entrance cuts the grade line though it would not be bad to lower the level a foot with an incline down from the entrance to point A. This latter method would cut down the height at the rear, allowing a shorter incline. In order to utilize the space in the northeast corner, which would be partially cut off by the incline this space might be lowered 12 or 8 in. and entered from the lower part of the incline. It would make a good location for the wash rack.

If you plan to do battery and tire repairing the 16 ft. strip along the south wall of the second floor might be partitioned off for that purpose.

We suggest a sliding door on the outside of the rear wall hung on pivoted hangers.



No. 180. Plan for building with storage capacity of fifty cars

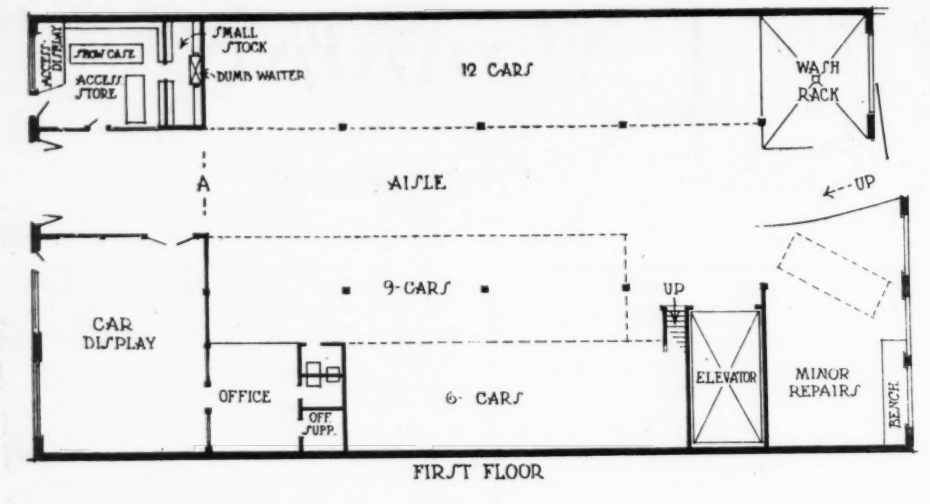
No. 184
WELL EQUIPPED REPAIR SHOP

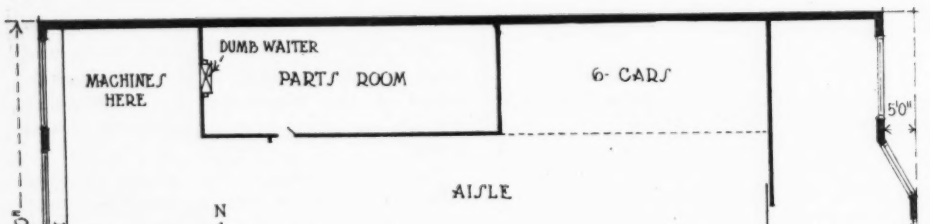
We are attaching a rough plot of one of our customer's new garage. You will note the building is seventy ft. long and forty ft. wide, inside measurements.

In the front part of the building he will have his accessories store, and in the back part the garage. There is to be no space allotted for the storage of cars. He is going to put in a complete vulcanizing plant, battery charging and repair department, welding outfit, compressor, lathe, drill press, hoist, and in fact, everything that is necessary to equip a modern garage for doing all kinds of repair work.

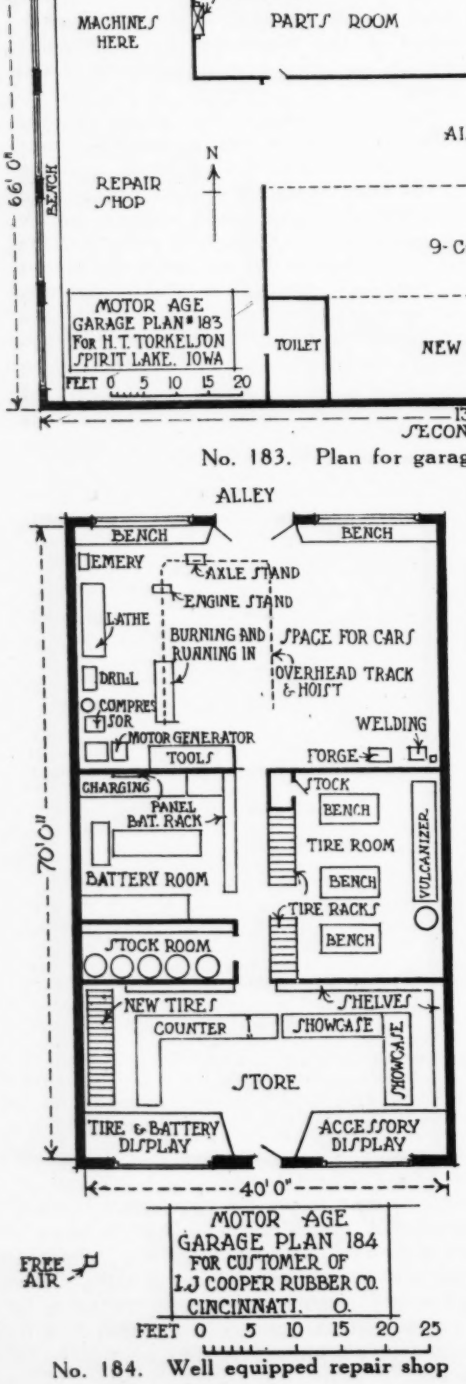
Knowing that you maintain a special department for going into this matter, we are writing you asking that you kindly furnish us with a blue print or drawing showing just what, in your mind, would be the ideal location for each unit. I might mention, in fact in this connection, that there is no basement or other floor than the first.—The I. J. Cooper Rubber Co., Cincinnati.

From your letter we judge your customer will specialize in accessory sales and tire and battery repairing rather than general car repairing. A complete vulcanizing plant and battery charging and repair department will eat into thin space to such an extent that he will be unable to store any great number of





No. 183. Plan for garage with large tourist trade



No. 184. Well equipped repair shop

cars and one must house cars in order to work on them.

We have cut down the departments to what are considered the minimum size with the exception of the store which might possibly be shaved down slightly but for the tire and accessory sales and handling batteries and tire repairs, space enough must be allowed so customers will be attracted to the place by a good display of stock and well kept surroundings.

On each side of the hall leading to the car repair shop are racks for tires and batteries forming the partitions to their respective repair rooms. This gives easy access to the finished tires and batteries from the store and also makes them handy to the shops. A small stock room for new tires and accessories is also handy to the store.

Frankly though we do not see how your man is going to apply his repair shop; it is well laid out and appointed to handle most any job as might come along but there is no space to take advantage of all the equipment. He cannot possibly house more than three cars and probably after the usual additions in the way of oil barrels and small parts stocks are accumulated he will be lucky if he gets in two cars. It appears to us that with his available space it would be better to specialize on batteries and tires and have a first class place in that line.

LAND YACHT, AHOY!

(*Continued from page 56*)

devices for this car, is made anti-rattling and rigidly secured. Adjoining the crate is an alcohol-burning marine type of range, just fitting the space, and having two burners on top and one burner for the oven underneath. The range is provided with a safety flame-trap. In cold weather the interior of the car is heated by operating the range. Overhead and surrounding the galley section there are four one, and four two-quart thermos bottles of unbreakable type placed in a non-rattling rack, and four two-quart thermos food jars.

There are receptacles for coffee and sugar storage and a three-gallon copper alcohol tank, fastened to the running board, carries the reserve supply of fuel.

An aluminum six-party cooking outfit is neatly fitted into a canvas covered case which contains two pots, one coffee pot, a frying pan, six plates, several bowls, six cups, teaspoons and tablespoons, knives and forks, and pepper and salt shakers. The case containing them is twelve inches in diameter and fourteen inches long. There also are containers for paper cups, napkins, thinwood plates and other articles to minimize "housekeeping." Close by are stored six collapsible metal folding campstools, a folding six-seat camptable and two heavy canvas collapsible ten-quart water pails, besides a safety oil-burning railroad type of lantern and two electric flashlights.

After the folding seats have been removed, four brown canvas cots, or bunks, are readily and rigidly put up and when not in use they are rolled around the crossbars and the whole is easily stored in a long pocket back of the running board. There is space here, too, for an axe, pick, hatchet, towline, skid chains and other tools and articles of road and camp equipment. The folding table is 30 inches square when set up and when folded into its pack, is six inches wide by 30 inches long. There is plenty of space for guns and fishing outfits and there is a sportman's basket, with ice compart, 28 in. long, by 10 wide and 6 high.

The tires used are Goodrich pneumatic silver tan cords, 35 by 5.

NASH ELECTS NEW OFFICERS

Kenosha, Wis., Feb. 10—At the annual meeting of the Board of Directors of the Nash Motors Co., W. H. Alford, vice-president, was elected to the board of directors; C. B. Voorhis, general sales manager and J. T. Wilson, assistant manager of the company, were elected vice-presidents.

Some three years ago when the Nash Motors Company was organized, Mr. C. W. Nash chose, among a large number of executives in the industry, three men for important positions in whom he placed great confidence.

That this confidence was well placed is evidenced by the action of the board of directors at the recent annual meeting, when the executive work of these three men was given official recognition.

The Readers' Clearing House

Questions and Answers

Conducted by ROY E. BERG
(Technical Editor, Motor Age)

THIS department is conducted to assist dealers, service stations, garagemen and their mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Motor Age reserves the right to answer the query by personal letter or through these columns.

MAKING A MAGNET

Q—INSTRUCT how to make a permanent magnet, stating the kind of steel to use, how to harden and to charge **magnet.**

2—Where can an electric magnet be obtained, suitable for charging magneto magnets to operate on a starting and lighting battery using voltage somewhere under 100 amperes?—James Smith, Traynor, Sask., Can.

1—As a rule the magnets used on either high or low tension machines are formed from special tungsten steel and are made as hard as possible. Soft iron magnets will magnetize as hard as possible. Soft iron magnets will magnetize more readily than the steel, but will not retain the magnetism. There is now a special grade of steel made for magnets exclusively. Inasmuch as the magnetism holds to the surface principally it has been found that where one magnet is placed over the other better results are obtained because of the greater surface. The magnets when formed may be casehardened by bringing them to a uniform bright red and plunging them into finely pulverized yellow prussiate of potash, repeating the operation several times, three or four times, and then dipping into clean, cold water. A thin case hardening can be accomplished by heating to redness and sprinkling the part with potassium cyanide, keeping the temperature constant for four or five minutes and then plunging into oil or water. We believe, however, you could arrange to procure the magnets made up from some of the magneto makers and then you will have a perfect job.

2—The following concerns will be apt to furnish you with magnet charging apparatus: Benjamin Electric Mfg. Co., 806 West Washington st., Chicago; W. D. Foreman, 1607 Prairie ave., Chicago; Paul Niehoff & Co., 232 East Ohio st., Chicago; St. Louis Electrical Works, 4060 Forest Park blvd., St. Louis, Mo.; Titan Engineering Co., Union City, Ind.

For a matter of from $25 to $35 a magnet charger can be constructed and if made right will serve your purposes well. But mind that it must be made correctly. Procure two soft iron cores, each 6 in. long and 1 in. in diameter. On the ends form a spool end, say about ⅜ in. of wood, to hold the windings of wire. Wrap paper around the core in several layers, with shellac over each layer and with sufficient layers to build up to at least ⅛ in. Wind each core with 7 lbs., or about 1800 ft. of 18 gage —B. & S. gage—cotton covered copper wire. This will make about 3000 turns on each magnet, or a few more than 6000 turns for the two.

As shown in Fig. 1 the winding of the cores must be opposite; that is, wind one way for one core and the opposite way for the other and connect as shown in the figure. Leave 2 or 3 ft. of the ends out. Look carefully over the wire insulation as you are winding, to be sure there are no breaks. After being wound one end of one core should be fastened to the wire on the end of the other core.

A base is also required, as shown. This should be of iron about ½ in. thick. Turn into one face two holes and have the diameter the same as the diameter of the windings. Have the edge of the holes about ½ in. apart. Be sure the cores are driven down so they come into close contact with the base.

In making a charge use, for this outfit a 110 volt direct current; if an alternating current is used it will require a rectifier between the electric light circuit and the magnets.

Place the magnet on the top of the cores, north pole of the magnet to be charged being on the south pole of the core and the south pole on the north pole of the electromagnet. The switch contact is closed and opened three times for about 5 sec. each. At the same time tap the magnet with hammers, on each side, to set up vibration. It will take from 30 to 90 sec. to complete the charging. Open the switch and remove the magnet and immediately put across the poles a soft bar or keeper to retain the charge.

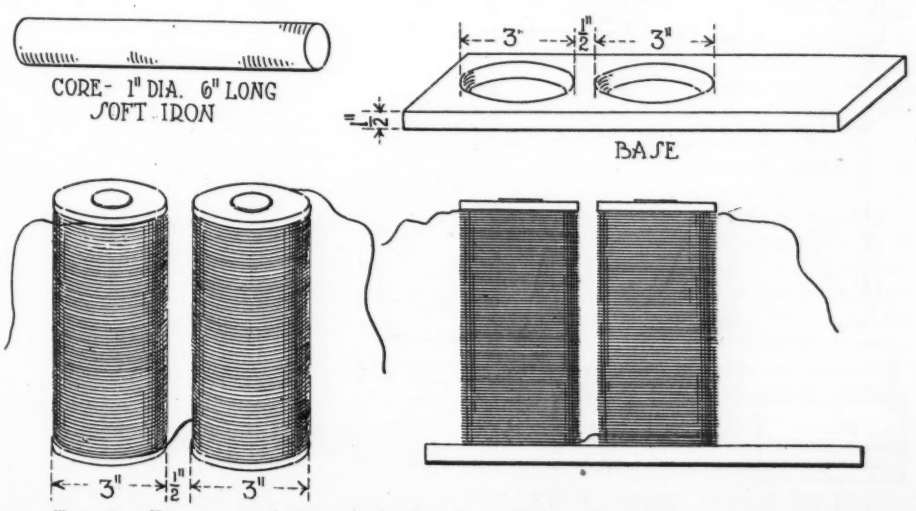


Fig. 1. Dimensional layout of electric coil for charging magneto magnets

1914 CADILLAC WIRING DIAGRAM

Q—Publish wiring diagram of a 4-cylinder, 1914 Cadillac. Car has Delco ignition system and is built with two rings and pistons.—A. E. Ziegenhain, Buffalo, Wyo.

This diagram is shown in Fig. 2.

CHARGING BATTERIES

Q—Publish diagram showing how to connect a system for charging batteries from 110 volt direct current generator.—R. F. Menke, Shawnee, Okla.

There is very little need of a diagram for this connection as only a resistance is needed in series with the batteries. Some sort of quick snap on connectors should be used so that a number of batteries can be placed in series, positive to negative, and these connected with the variable resistance.

CORRECTING COIL BY BAKING

Q—We are experiencing considerable trouble with our Connecticut coils going dead on our Overland cars. What is the cause of this and what changes would you recommend? What other coil would you suggest we try?—C. B. Roy, Lafayette, La.

There is a possibility of the coil being punctured. Perhaps it will be well to try baking it. Place in an oven, with slow heat, and leave the door open for safety sake. When thoroughly baked and dried out be sure the brass ground pole is scraped off clean. If this does not work a new coil will be needed and this will cost $10.

ACTION OF DELCO CIRCUIT

Q—Explain what takes place in the Delco system in case of a short circuit as I understand there are no fuses in this system.—Malden Garage, Malden, Wash.

It is true that there are no fuses in the Delco circuit, but there is another scheme used that replaces the necessity for a fuse. Underneath the dash, and incorporated as a part of the switch is a circuit breaker that will open on a short circuit. This circuit breaker is composed of a very heavy wire and a pair contacts made by the core of the solenoid. This circuit breaker can be heard to click when there is a short circuit in any of the circuits. It is arranged so that the exact circuit can be easily located. This is done by turning on one of the plug switches. If a click is heard in the switch then the trouble is that circuit just turned on. If no click is heard try another circuit, and another, until the proper one is found. Then the final location of the trouble is a matter of tracing that particular circuit, starting at the most exposed places and if these fail to present any clews, then the wires themselves must be inspected.

WIRING DIAGRAM FOR OAKLAND

Q—Publish wiring diagram for 1913 Oakland car model 35 showing internal wires and connections of Deaco generator and ignition system.—Wm. C. Hutchison, Sedalia, Mo.

To assist readers in obtaining as a unit all information on a certain subject MOTOR AGE segregates inquiries in this department into divisions of allied nature. Questions pertaining to engines are answered under that head and so on.

THE ELECTRIC SYSTEM

James Smith....Traynor, Sask., Can.
A. E. Ziegenhain.....Buffalo, Wyo.
R. F. Menke.....Shawnee, Okla.
C. B. Roy.....Lafayette, La.
H. J. Chadderton.....Farrel, Pa.
Peter Brust.....Milwaukee, Wis.
Malden Garage.....Malden, Wash.

MISCELLANEOUS

W. W. Williams.....Quincy, Ill
J. Stanley Ford.....Findlay, Ill.
Uneedme Service Co.....
.....New Orleans, La.
Geo. Laatsch .....Altamont, Ill.

CARBURETION

Leonard Balletto.....Chicago

LUBRICATION

Joe Hinviler....San Francisco, Calif.

ENGINES

J. J. Lauston.....St. Louis, Mo.
Geo. Laatsch.....Altamont, Ill.
Blake Hobart.....Pemberville, Ohio
R. E. Lockwood.....Lansing, Mich.

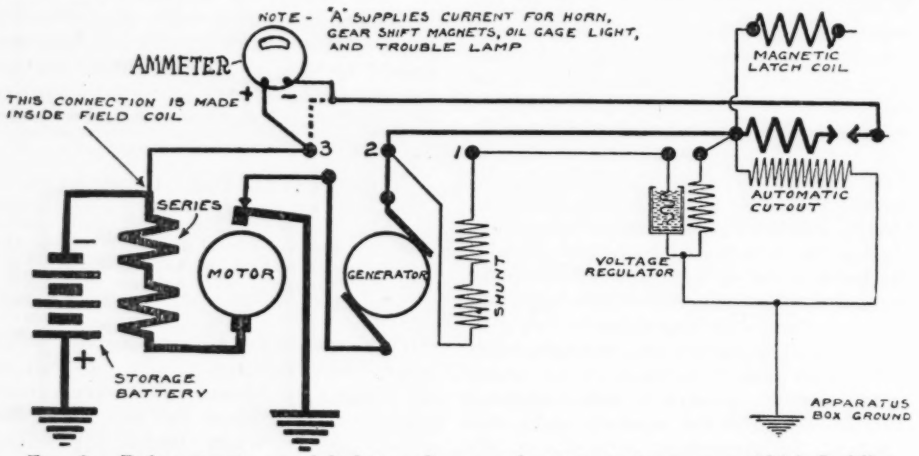


Fig. 2. Delco starting and lighting diagram for connections on a 1914 Cadillac

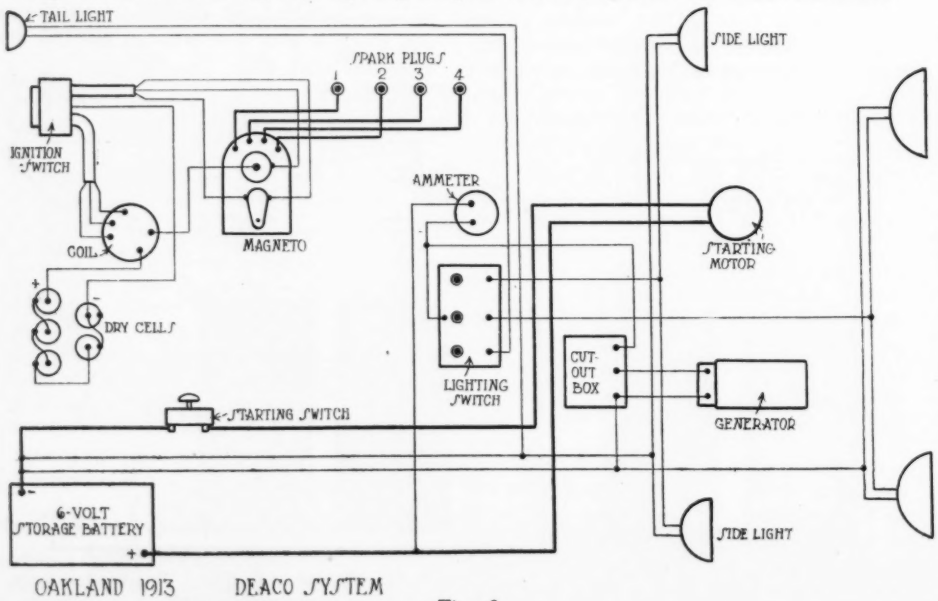


Fig. 3.

The diagram of this car is shown in Fig. 3.

CLUTCH ON MOON CAR

Q—What is the type of clutch on a model 90 Moon car? Does it require any attention?

2—Instruct how to adjust the clutch of a model 90 Moon car.

3—Where can adjustments be made on the differential and transmission to take up wear on the model 90 Moon car?—Dr. W. W. Williams, Quincy, Ill.

1—The clutch is of the single drive plate type.

2—The clutch is provided with a single adjustment for taking up the wear. After long service the friction rings may become worn sufficiently to allow the clutch to slip and prevent its taking hold quickly after engaging. To take up the wear and eliminate this trouble remove the clutch housing cover. Have some one turn the engine over slowly with the hand crank and you will note two hexagon headed screws projecting through semi-circular slots in the clutch cover on back of the flywheel. Loosen the two screws and, holding the clutch disengaged, move them in their slots a half inch or so to the right, in a clockwise direction. Upon tightening the screws the wear will be taken up and the clutch will be as good as new.

3—To adjust the differential proceed as follows. Remove the back cover plate of the gear housing, then thoroughly clean off all the excess grease so that you can see the parts and work with them. Remove the wire that holds the castle nuts which hold the differential carrier. The carrier can now be moved from side to side by turning the notched collar at each side of the ring gear. If the gears have more than 0.006 in. clearance between the teeth they are too loose. This clearance can be determined by running a piece of wrapping paper through the teeth. Wrapping paper of the ordinary kind, brown in color, has thickness of about 0.006 in. By running this through the teeth, turning the rear wheels, and then examining the paper you can tell the condition of the gears. Move the carrier so that the ring gear is brought closer into contact if too loose and away if too tight. Then re-assemble the parts. Now it might be after putting the parts together that you have not obtained the right adjustment. Perhaps the gears apparently line up at their backs but they nevertheless howl. This first adjustment is merely an attempt at getting the ring gear in its right place. The final adjustment can be made very nicely by adjusting the pinion gear. A little plate will be found on top of the rear axle housing which when removed will show the notched collar that is the adjustment means on the pinion gear. Turning this to the right will make the pinion engage closer with the ring gear, and turning it to the left will move the pinion gear out of contact with the ring gear. With the assistance of some one, to help drive the car, the final adjustment can be obtained. Drive the car over some smooth

level road at a moderate speed and then remove the floor boards in the tonneau and make this adjustment until the gears operate without noise or as silent as it is possible to make them operate. Now by filling the rear end with heavy oil, say 600 W steam oil, you ought to have a silent running rear axle.

INCREASING SPEED OF ROADSTER

Q—In what way can the greatest amount of speed be obtained from a Buick roadster which will not interfere with the efficiency and economy in running the car?

2—Would the installation of aluminite pistons and the enlarging of the valve area increase the speed? Could the Green Engine Co. of Dayton, do this work?—J. Stanley Ford, Findlay, Ill.

1-2—The essential thing, of course, is to put the engine in the best possible shape and this is not a small job. It means having true cylinders even if they have to be reground. This will call for oversize pistons. These should be of aluminum alloy. You will have to fit them according to the maker's instructions, with a clearance of from 0.003 to 0.004 in. Racing or extreme speed calls for somewhat more clearance than if the car were to be used for ordinary purposes, for naturally the engine will develop heat and the expansion will be more.

The pistons and the connecting rods should be carefully balanced and the crankshaft and connecting rod gearings should be just as carefully fitted as possible. You can ream out the valve seats and install larger valves, at least ⅛ in. larger in diameter. If you can make larger manifolds, so much the better, for this will permit a larger volume of gas to enter the combustion chamber and at the same time the larger exhaust manifold and pipe will take the burned gas away more readily and tend to eliminate some of the heat. Whether you fit larger manifolds or not you can install a larger carbureter, for you will require more fuel for high speed work. You can do some good by smoothing up every particle of the interiors of the inlet and exhaust manifolds in order to make a smoother passage for the gases.

Speed calls for plenty of lubrication, and to be safe we suggest you have a 2-gal. special reservoir or tank and use a hand feed pump to supply oil to the crankcase as often as the engine seems to need it. It will need it all the time if driven at high speed for any length of time. This pump should be located at the front end of the driver's seat, so as to be handy for either the driver or mechanic.

There is one thing more about the engine and that is to procure a speed camshaft if possible or setting the one you have a trifle earlier. This will call for some experimenting. Likewise the ignition can stand a little advance for fast work.

Your gear ratios ought to be increased; wire wheels will offer less wind resistance and will be more easily changed in case of tire trouble. Drop the frame all that is possible by having reasonably flat springs and wrap these with tape to prevent rebounding; at the same time shock absorbers should be fitted as well. Naturally you will drop the steering post and it will be a good idea to have the fenders fitted so they can be removed in a minute's notice. Canvas fenders are light, will not rattle and will be ideal for a speedster, although they do not look as well as heavier ones. The front ones can be fixed to the fender supports in front and attached to a bracket or the running board at the other end, with springs to keep them taut. The rear fenders can be treated the same way.

If you wish to go still further you can put on a large fuel tank and have a pressure pump to force the gasoline to the carbureter. Also you might put on a high tension magneto and then you will have some speed wagon.

Yes, the Green Engine Co. can assist you with the pistons and connecting rods.

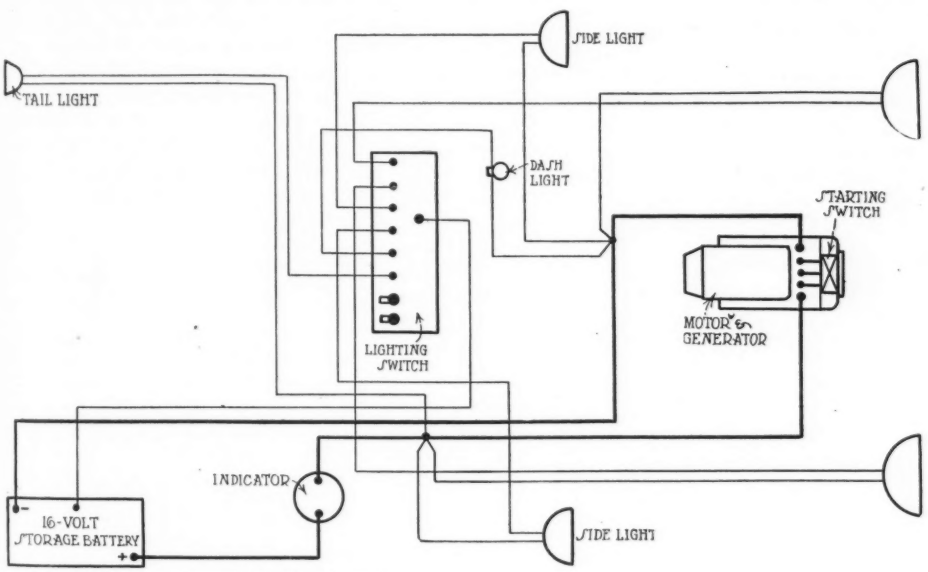


Fig. 4

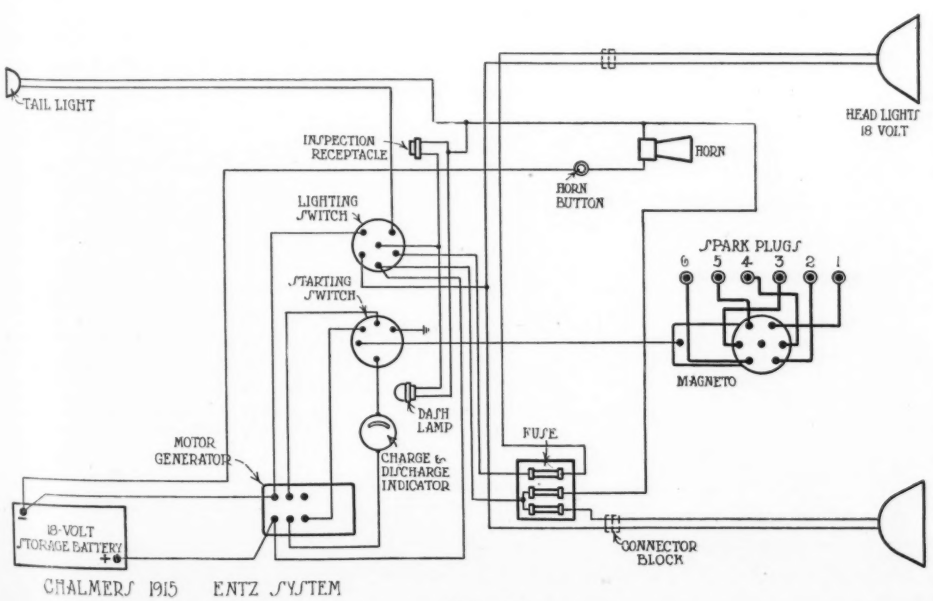


Fig. 5

INSTALLING VACUUM TANK

Q—Instruct how to install vacuum tank on 1917 Pierce Arrow car.—Uneedme Service Co., New Orleans, La.

To install the vacuum tank on the Pierce Arrow of 1917 you will have to change the gasoline line slightly, tap a hole for the manifold vacuum connection in the manifold at a point near the tank installation and then change the carbureter connection.

The gasoline line will not have to be renewed. The pressure line from the pump on the engine will have to be disconnected and just whether you will have to remove the plunger from the air pump of the engine is a question that you had better decide for yourself. The belief is that the pump should be dismantled, for there will then be no opportunity for the pump to wear and make a noise.

The gasoline line will have to be connected to the bottom of the tank. You will have to make a hole in the bottom of the tank and then add some pre-

enforcing metal to form a foundation to solder the connection to. The illustration of the pipe line with the vacuum tank is shown in Fig. 7, and the gasoline system as is now on the car is shown in Fig. 8.

WANTS TO GET IN USED CAR BUSINESS

Q—I want to start in business selling used Ford cars. Where can they be purchased for this purpose?—Geo. Laatsch, Altamont, Ill.

This is a rather difficult question to answer. It might be that in order for you to establish yourself in this business that you will have to create some sort of a used car clearing house as has been attempted in several cities. For just where you can purchase these cars wo do not know. Generally the man who buys a new car and who already has a car will trade in his used car with the dealer of whom he is to purchase the new car.

A business of this sort, it seems has only one logical foundation since the majority of the used cars are taken in by dealers in trade as part payment on the new car. That is that the man purchase from the dealer all his used cars and run an exclusive used car business. Of course there are several phases of this business that make it possible to handle the cars in a different way. For example it might be possible for you to represent say twenty-five dealers in surrounding counties, and act as their representative, not purchasing their used cars, but merely selling them, as an agent would do.

Ball & Ball Carbureter Adjustment

Q—Give adjustments of the Ball & Ball carbureter used on an Oldsmobile.—Leonard Balletto, Chicago.

Before starting the engine turn both the low-speed screw and spray needle to their seats. Next open the spray needle on the bottom of the carbureter one and a half turns. With the adjustments in this position the engine can be started.

After the engine has been warmed up to normal driving temperature, place the spark lever in the full retard position and open the throttle quickly. If the engine does not backfire, the mixture is slightly rich and the spray needle should be closed by turning to the right about an eighth of a turn. Open the throttle again quickly and repeat this operation until the engine does backfire, which shows a lean mixture. Open the needle slightly to correct setting for all high and intermediate stages of work.

Now adjust the throttle stop screw until the desired idling speed is obtained. If the engine does fire smoothly, the low-speed mixture is too rich and should be corrected by backing out the low-speed screw on the side of the mixer chamber, which will admit sufficient air to make the firing smooth. Then lock in position with lock nut. If the engine has increased in speed from this adjustment, restore the idling speed by unscrewing slightly the throttle stop screw and, if necessary, reset the low-speed screw, both of which must be adjusted in combination. If a more economical mixture is desired, the high and intermediate adjustments may be repeated, having the spark set in the usual driving position instead of retarded. This adjustment will reduce acceleration slightly. Be particular to leave the choker in a wide-open position. Have the choker button on dash all the way in.

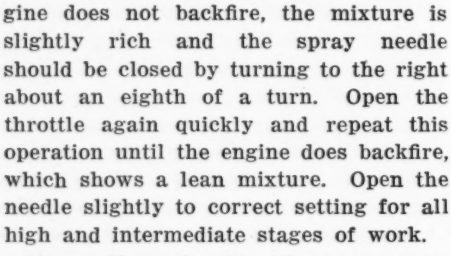


Fig. 6. Ball and Ball carbureter used on 1918 Oldsmobile

OILING SYSTEM ON STEARNS KNIGHT

Q—Explain oil system regulation as used on Stearns-Knight model.—Joe Hinviler, San Francisco, Calif.

An oil pump, located at the front of the left-hand eccentric shaft, draws the oil from the reservoir in the crankcase and forces it through the strainer—thence to the crankshaft feed line and the distributer—or auxiliary cylinder oiler which lubricates the sleeves and piston by means of separate and independent feed lines.

The oil passes through leads to each main crankshaft bearing — thence, by means of a drilled crankshaft, to the connecting rod bearings. The overflow from the main bearings finds its way on the counterweights of the crankshaft and is splashed onto the small connecting rods which operate the sleeves. A quantity of this splash is also picked up by the pistons, which in addition, receive oiler.

An auxiliary oiler located at the front of the crankcase and between the cylinders Fig. 9 distributes the oil to the individual cylinders under pressure, and acts as an independent means of oiling the pistons and sleeves. The overflow of oil from the auxiliary oiler is used in the lubrication of the chains. Note that this is a full force feed system, with the exception that the wrist pins are not force feed fed.

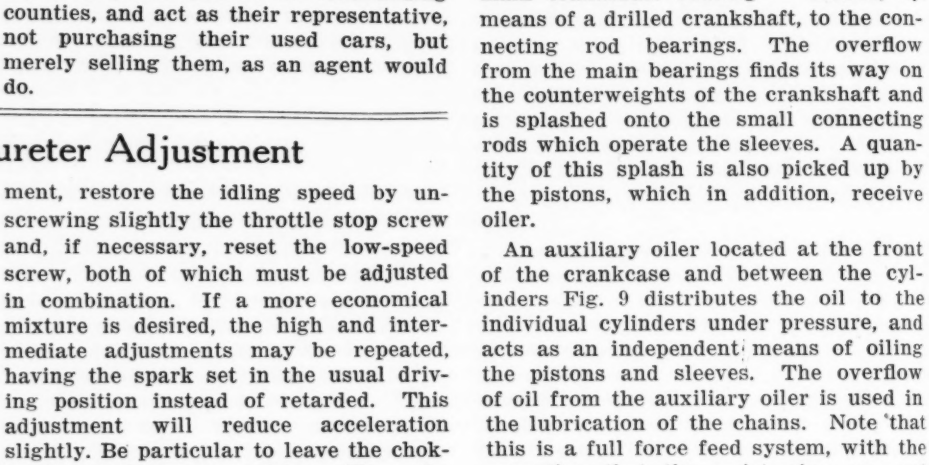


Fig. 7. Diagrammatical layout for vacuum tank installation for 1918 Pierce Arrow. A turn should be put in the gasoline feed line to absorb the vibration and thus reduce the possibility of fuel line breakage

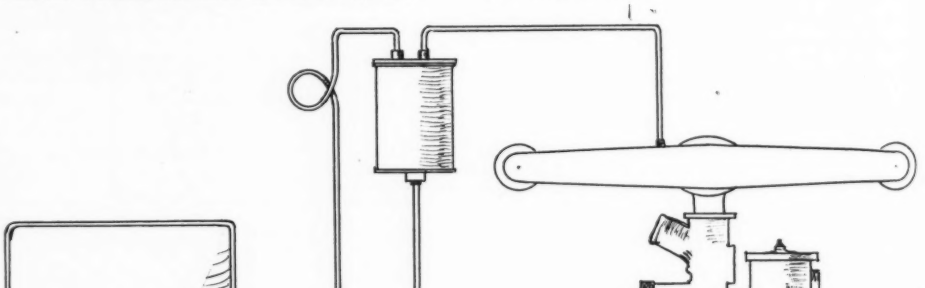


Fig. 8. Layout of piping as used on 1918 Pierce Arrow for fuel feed

Two strainers are employed in this system of lubrication to insure complete filtering of the oil before it is again used.

About once in 1,500 or 2,000 miles the oil should all be drained from the engine and the system cleaned and flushed out with kerosene.

Remove the oil pan from the engine base and thoroughly clean it; wash out the oil in the bottom of the pan; fill with fresh oil to level indicated by gage.

The Power Plant

VALVE CLEARANCE ON HOT ENGINE

Q—New rings were installed in a 1918 Maxwell touring car. First and third were step rings and second McQuay Norris leakproof. New valve stem guides were installed, seats were reamed and valves ground. The bottom of the valve stems were ground and new tappet screws installed. Valves were given clearance of .006 with engine cold. After running the engine about one hour, clearance was .008 when engine was warm. Then it was again reduced to about .006, and find after running several hours, clearance has again increased to .009. All articles contend that clearance will decrease when the engine is hot owing to increased length of valve stem. Would not the block lift owing to heat account for the difference in clearance? These valves should have a clearance of from .004 to .008 when warm. How should they be set when cold? Should valves be adjusted when piston is at top on compression stroke or when pusher is on heel of cam?

2—No. 3 cylinder has a tap similar to a valve tap, only more metallic. This occurs at different times when the engine is idling but occurs regularly when plug is short circuited. What causes this? What causes hissing from exhaust? It occurs irregularly as follows: pist-pist then several revolutions of engine and it may hiss only once or several times. Is this a miss or only the exhaust passing through the muffler? Plugs and ignition good.—J. J. Lanston, St. Louis.

1—Ordinarily it is considered that valve clearance decreases as the engine becomes hot. It is true that the engine in warming up becomes higher because of the expansion of the metal. However the valves being in direct contact with the gases and not being water cooled heat up more than the block, consequently the expansion is greater on the valve than on the block. Now just why valve clearance increases as the engine heated up we cannot say. A clearance of .003 to .005 when cold will assure proper operation when the engine is warm.

2—The hissing noise which you hear from the muffler, in the estimation of the writer is caused by a loading in the intake manifold.

GEAR RATIO OF HUDSON

Q—What is the gear ratio and speed of a Hudson Super-Six roadster?

2—What is the gear ratio and speed of a Stutz Bearcat?

3—What speed can I obtain from a 490 Chevrolet roadster using a 3 to 1 gear or a 2¾ to 1 gear? The tires are 90 in. by 3½ in.—Geo. Laatsch, Altamont, Ill.

1—The Hudson Super Six had a gear ratio of 4.46 to 1. The speed of the car is a factor that is dependent upon a good many things. For example the car must be in good condition. The kind of lubricating oil, strange as it may seem, will effect the final speed attainable. The driver has a good deal to do with what may be obtained from the engine. So, when we say that the Hudson speedster model will attain a speed of about 65 to 68 miles an hour we do with all these things in mind.

2—About 75 m.p.h. The information regarding gear ratio is not available.

3—With a 2¾ to gear and pinion you can attain about 65 m.p.h. with the Chevrolet. The larger ratio will be in proportion.

RACING MOTORCYCLE

Q—What would the approximate horsepower of an Indian "power-plus" motorcycle engine be, having a bore of 3¼ in. and a 3 43/64 in. stroke and equiped with an eight valve-in-head racing cylinder head?

2—Where could one of these racing cylinder heads be purchased?

3—What is the valve timing of an Overland model 83?—Blake Hobart, Pemberville, Ohio.

1—It is rather too difficult to state just what the actual power development would be with such a head, but it will probably be in the neighborhood of 28 at 2500 or 2600 r.p.m.

2—This we do not know but recommend that you try the Hendee Mfg. Co., Springfield, Mass.

3—The intake opens 8 deg. after upper dead center, closes 38 deg. after lower dead center. The exhaust opens 46 degrees before bottom dead center and closes 15 deg. after top dead center.

HUDSON CRANKSHAFT

Q—Publish diagram of the Hudson Super-Six crankshaft and explain the patented features.—R. E. Lockwood, Lansing, Mich.

The Hudson Super-Six crankshaft is shown in Fig. 10. The special feature about it is that the weights are placed not to counterbalance any out-of-balance of revolving parts, but to neutralize the effects of the harmonic vibration that is set up as a result of the inertia forces which are existent when the engine is run. This tends to make the shaft run just as if a turning moment is applied. The torsional vibration, which is the effect of having the shaft run ahead of itself and then lag behind, only occurring at a high rate of speed is also overcome to a certain extent, because the shaft is made very heavy.

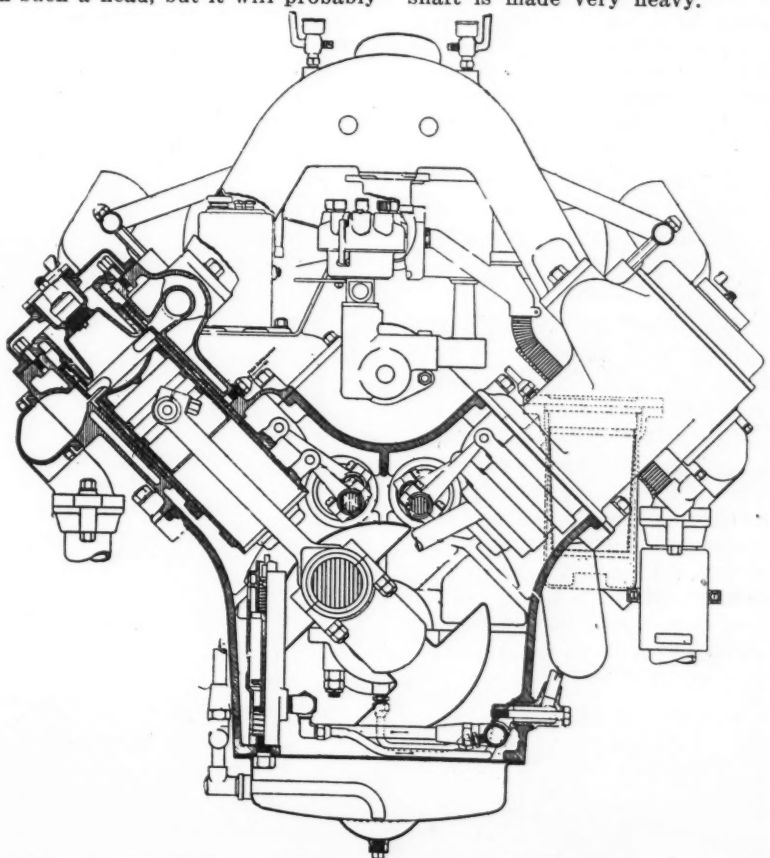


Fig. 9. Cross-sectional view of Stearns Knight engine showing the pipes through which the oil is conducted

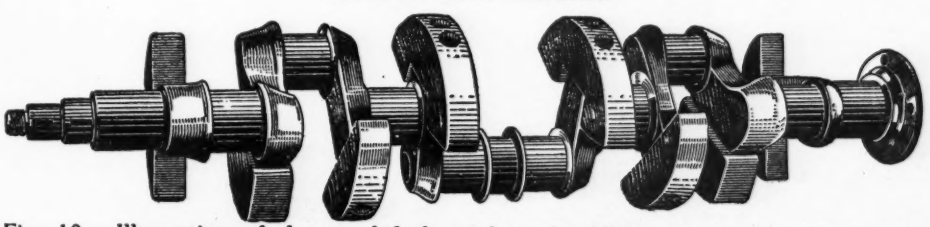


Fig. 10. Illustration of the crankshaft used in the Hudson super six showing the counterweights, which it will be noticed are not set in a position symmetrical with the throws of the shaft but are placed to counterbalance the intertia forces

Service Equipment

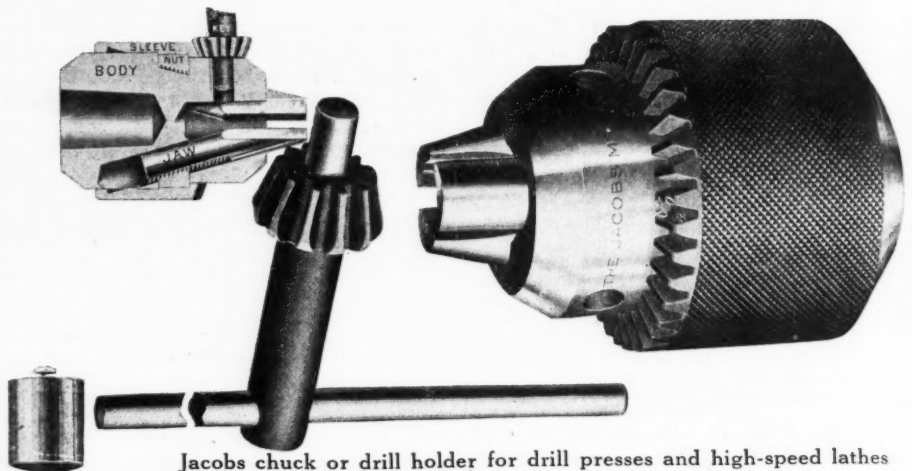
Time Savers of the Shop

Steam Vulcanizing Plant

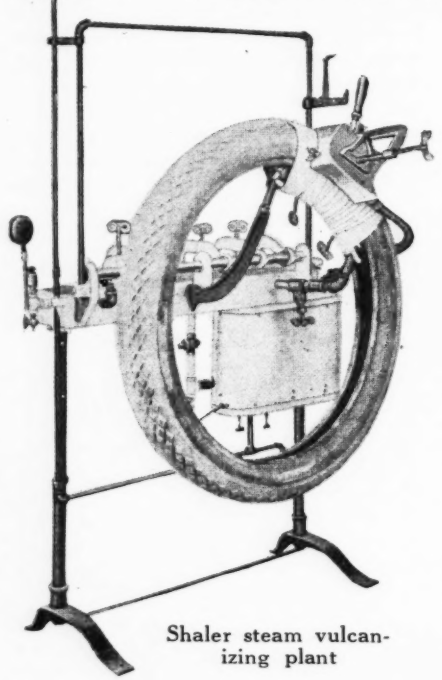
The C. A. Shaler Co., of Waupun, Wis., is now making a new type of vulcanizing equipment that is particularly applicable to the small repair service station. It handles all kinds of tubes and is large enough to take care of the majority of casing repair jobs. It is furnished to be heated with gas or gasoline as the requirements may specify. One particularly valuable feature about this vulcanizer is that an automatic temperature control is built into it. With this scheme it becomes impossible for an operator to overheat a tire. The thermostatic damper automatically regulates the flame as long as the burner is lighted. The repair forms for casings are of the type that cures the tire from the inside and outside at the same time, which makes it possible to repair blowout in less than an hour. The daily capacity of this machine is therefore about ten casings; in addition about six tubes can be finished every twenty minutes, or the tube capacity is about 200 a day. The list price of this machine is $70.00.

Jacobs Chuck or Drill Holder

The Jacobs chuck or drill holder for application to drill presses and high speed lathes, etc., is a new quick acting chuck that holds the drill tightly and which can be released with the special tool that is furnished as shown in the illustration. A knurled barrel surrounds the chuck which controls the operation of the three jaws. The bottom of the sleeve is cut with a bevel tooth gear and these teeth engage with the smaller teeth furnished with the wrench as shown. This chuck is made by the Jacobs Mfg. Co., Hartford, Conn.



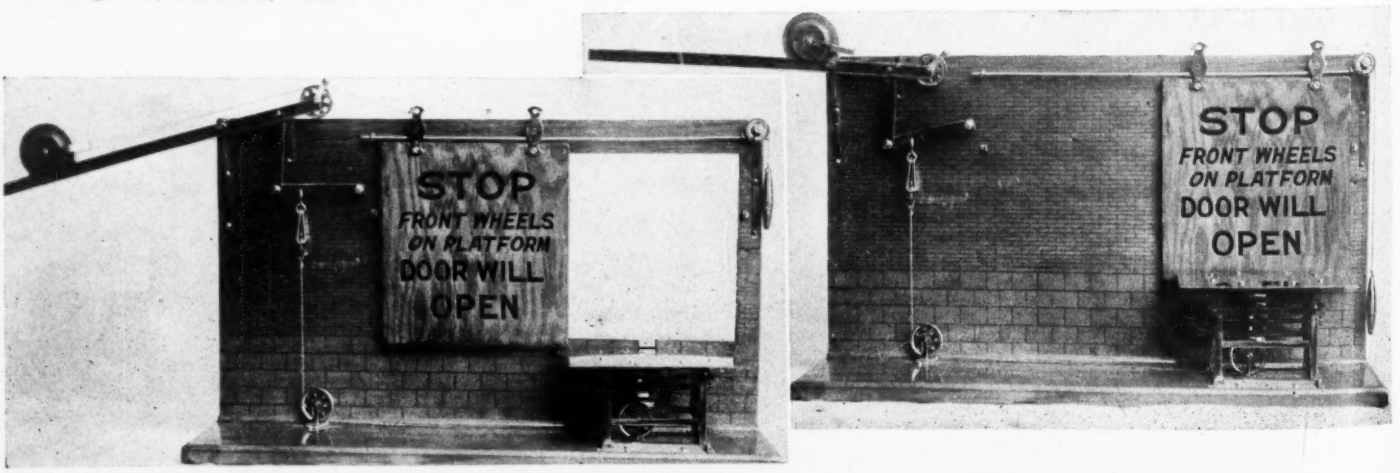
Jacobs chuck or drill holder for drill presses and high-speed lathes



Shaler steam vulcanizing plant

Doan's Automatic Door Opener and Closer

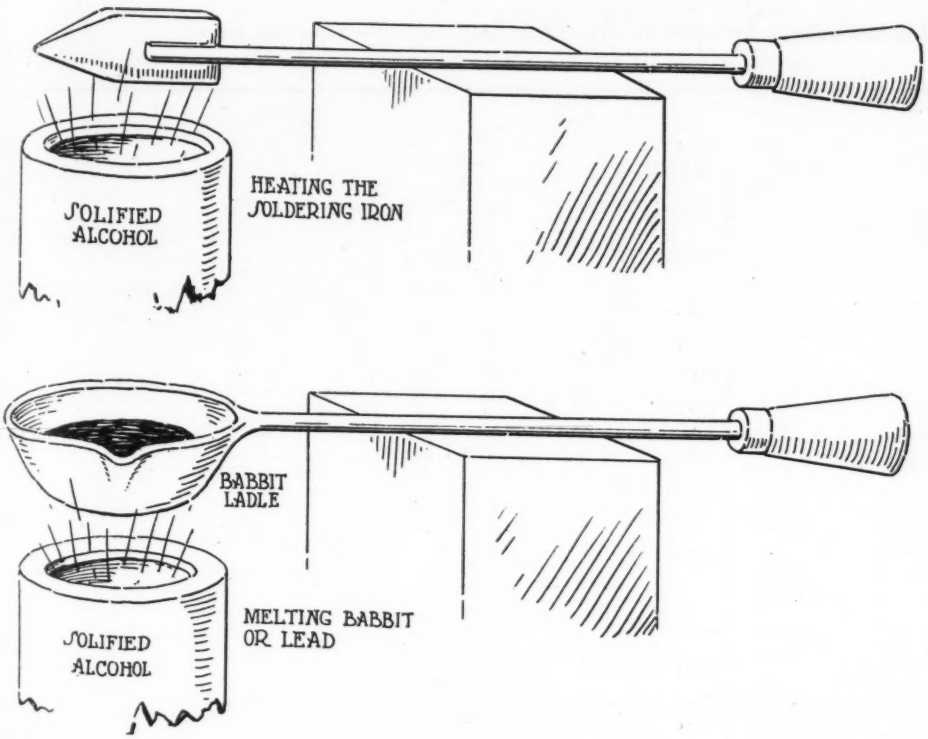
An automatic service station and garage door which opens by means of the weight of a vehicle and closes after the vehicle has passed through is being made by Howard E. Doan, Joliet, Ill. Among the more important functions of this door is that of eliminating the necessity of having a mechanic or helper leave his work to open and close the door. In fact it does away entirely with the human element. When an owner drives up to the door the car rests on the platform which sinks slightly and releases a catch whereupon the weight attached to the door mechanism through cables and other fixtures opens the door. Similarly the door will close when the car has passed into the building and is just beyond the door, where its weight operates another catch and closes the door. The door can be used only to best advantage where building space is limited and where swinging doors are not desired.



Doan's garage-door opener which operates by the weight of a vehicle and closes door after vehicle has passed

The Automotive Repair Shop

Practical Maintenance Hints



Here is shown a convenient means of heating the soldering iron by use of a can of solidified alcohol

Using Solidified Alcohol for Heating Iron and Melting Babbitt

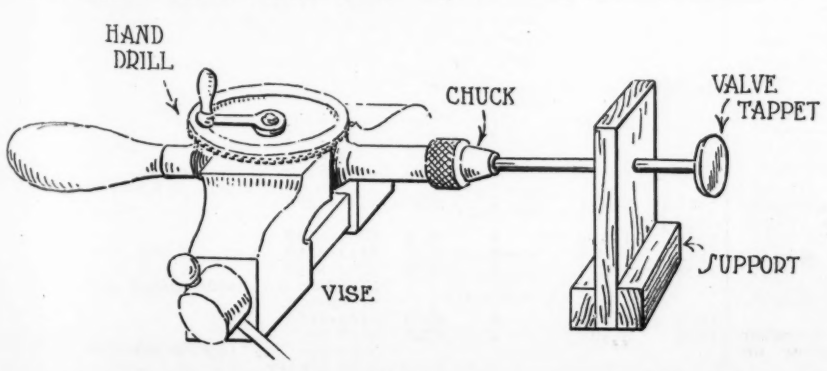
A convenient means of heating the soldering iron is by means of a can of solidified alcohol. A can of this material costing only a small sum, is convenient for the garage use, tempering small tools, melting babbitt metal, and other details, where heat is wanted without the bother or expense of the plumbers' torch or tinners' stove. One owner used this means of heating the intake manifold of his motor for cold weather starting, but this use is not advised unless your car is insured.

Cushion Dressing Spraying Device

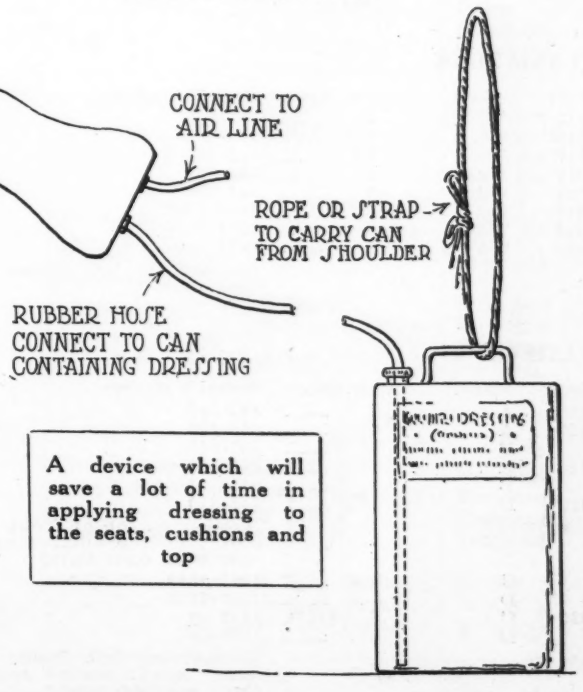
We are giving below a shortcut which has been very useful to us in repainting second hand cars. For applying dressing on the seats and cushions, and dressing on the top. We use an engine cleaner such as the market affords in which one side is connected to an air line and the other side connected to a can containing the dressing. You will use less dressing material and also do a better job because the air pressure will force the dressing into the tufting.—F. J. Vautrot, Durand Auto Co., Durand, Wis.

A Simple Method for Touching Up Valve Tappets

The usual way to tune up worn tappets is to grind them in their places with emery dust or some other abrasive. But it often happens that certain tappets require special attention and need to be removed. A simple way to true them up is shown in the sketch. A small hand drill is made fast in a vise with the chuck extending over the bench. A wood block is then set up and braced with a hole bored through it just big enough to take the stem of the tappet. The tappet is then run through the hole in the support and the shank placed in the chuck of the drill. It is a simple matter then to turn the handle of the drill with one hand and to hold the emery cloth or whatever is used at the right point against the worn surface of the valve tappet.



Below is shown a sample method of touching up valve tappets by the use of a hand drill made fast in a vise



A device which will save a lot of time in applying dressing to the seats, cushions and top

Passenger Car Serial Numbers

Motor Age Maintenance Data Sheet No. 82

One of a series of weekly pages of information valuable to service men and dealers—Save this page

CRAWFORD

Year	Model	Cyls.	Price	Serial Numbers
1912	12-30	4	$1600	730-840
	12-40	4	2100	
1913	13-30	4	1750	841-926
	13-40	4	2100	
1914	14-30	....	.....	927-987
	14-40	4 & 6	1750	-------
1915	15-6-35	6	1850	988-1090
	15-40	....	2100	
1916	16-40	6	1650	1091-1195
1917	17-40	6	1750	1196-1234
1918	18-40	6	2250	1235-1294
1919	19-6-40	6	2500	1295-1337
1920	20-6-40	6	2750	1340 up

Number on heel board of front seat

CROW-ELKHART

Year	Model	Cyls.	Price	Serial Numbers
1914	D-45	4	$1245	6000-6500
	D-55	4	1650	
	D-56	4	1650	
1915	E-45	4	1145	6501-7200
	E-65	6	2250	
	E-66	6	2350	
	E-25	4	725	
1916	CE-30	4	725	7201-9025
	CE-33	4	795	
1917	CE-33	4	935	9026-13295
	CE-35	4	845	
1918	CE-32-34 & 36	4	995	13296-15292
1919	CE-32-34 & 36	4	1095	15293-17411
	H-42-44 & 46	6	1355	
1920	L-55-4 & H-55-6	....	.....	17412 up

Number on seat frame under front cushion

CUNNINGHAM

Year	Model	Cyls.	Price	Serial Numbers
1912	J	4	.....	181-305
1913	M	4	.....	306-455
1914	R	4	.....	456-755
1915	S	4	.....	756-990
1916	V-1	8	.....	991-1297
1917	V-2	8	.....	1298-1597
1918-19	V-3	8	.....	1601-2300
1920	V-3	8	.....	2451 up

Number on left frame member near radiator

DANIELS

Year	Model	Cyls.	Price	Serial Numbers
1916	A	8	.....	103-257
1917	A	8	.....	258-302
	B	8	.....	401-560
1918	A	8	.....	361-383
	B	8	.....	561-741
1919	B	8	.....	742-873

Number on top of front gearcase cover; engine number on crankcase near distributor

	C	8	.....	1001-1049
	D	8	.....	1101-1131
1920	C	8	$4500	1132 up
	D	8	.....	1050 up

Number on left frame member under hood; engine number on front gearcase cover

DAVIS

Year	Model	Cyls.	Price	Serial Numbers (Engine number used as car number up to and including 1918)
1912	40	4	$1850	Continental C, 101-1800
1913	40	4	2000	Continental C, 1801-4270
	50	4	2100	Continental E, 4186-7569
1914	35	4	1335	Continental 4N, 111-874
	Six-50	6	2150	Continental 6P, 1023-2920
1915	38	4	1235	Continental 4N, 1175-7082
	Six-50	6	2150	Continental 6P, 1023-2920
1916	Six-F & G	6	1095	Continental 7W, 1005-17650
	Six-E	6	1495	Continental 6N, 1719-8693
1917	Six-H, I	6	1195	Continental 7W, 17651-67452
	Six-K	6	1795	Continental 7W, 17651-67452
	Six-J	6	1495	Continental 7N, 14582-30983
1918	Six-H, I, L	6	1485	Continental 7W, 5001-5600
	Six-K	6	1850	Continental 7W, 5001-5600
1919	Six-H, I, L	6	1685	5001-6000
	Six-N & P	6	2300	
	Six-J, M	6	2050	
1920				Number on left rear motor arm 6001 up

Number on right side crankcase just above Continental name plate

DETROITER

Year	Model	Cyls.	Price	Serial Numbers
1916	F	4	$985	15000-20000
	6-45	6	1098	
1917	6-45	6	1195	20000 up
	Discontinued			Number on dash plate

DIRECT DRIVE—See Champion

DIXIE FLYER

Year	Model	Cyls.	Price	Serial Numbers
1916	L	4	$795	Under 2200
1917	L X	4	895	2200-3500
1918	L S	4	995	
			1095	3500-5000
1919	H-S-50	4	1365	5000 up
1920	H-S-50	4	1465	

Number on left front spring horn and on dash under hood

DODGE

Year	Cyls.	Price	Serial Numbers
11-14-14 to 10-31-17	4	.....	1-200000
8-18-15 to 2- 1-18	4	.....	25000-225000
2- 9-16 to 4-26-18	4	.....	50000-250000
6-15-16 to 8- 8-18	4	.....	75000-275000
10-23-16 to 12-13-18	4	.....	100000-300000
2-17-17 to 3-19-19	4	.....	125000-325000
5- 1-17 to 3-19-19	4	.....	150000-250000
8- 3-17	4	.....	175000-275000

Number stamped on frame under floor board; engine number on left side just above carburetor

DORRIS

Year	Model	Cyls.	Price	Serial Numbers
1912	G	4	$2500	3001-3255
1913	H	4	2500	5001-5281
1914	I	4	2500	6001-6110
				Number on front end crankshaft
1915	I-A-4	4	2250	6111-6220
1916				
1916	I-A-6	6	2475	8001-8140
1917	I-B-6	6	2475	8141-8289
1918	I-C-6	6	2985	8300-8392

Number on name plate left side of motor

1919	6-80	6	4350	8401-8658
1920	6-80	6	4350	8659 up

Number on top crankcase left side center

Tire and Rim Sizes

Motor Age Maintenance Data Sheet No. 83

One of a series of weekly pages of information valuable to service men and dealers—Save this page

1919 Cars—Continued

CAR AND MODEL	Make of Tire	Size of Tire	Style of Bead	Type of Rim	Make of Rim
Maibohm, B	Opt	32x3½	S. S.	Demountable	Stanweld
Marmon, 34	Goodrich	32x4½	Front C ribbed. Rear C non-skid	S. S.	Stanweld
Maxwell, 25	Opt	30x3½	Clincher	Demountable	Firestone
McFarlan, 127	Goodrich & U. S.	35x5			
Mercer, Series 5	Goodrich Goodyear Firestone	32x4½		S. S.	Howard & Stanweld
Metz	Goodrich	32x4	S. S.	Detachable	
Mitchell, E-40	U. S.	34x4 33x4	S. S.	No. 76	Firestone Stanweld
Mitchell, E-42	U. S.	34x4 34x4½	S. S.	No. 21 No. 76	Stanweld Stanweld
Moline-Knight, L	Goodrich or Firestone	34x4	S. S.	Demountable	Firestone
Monitor, M	Miller	33x4	S. S.	Demountable	Stanweld
Moon, 6-46	Miller	32x4	Geared to Road	S. S.	Firestone
Moore, D	Firestone	30x3½	Rear—Diamond Front—Plain	Clincher	Perlman
Nash, 681-3-6 & 7	Firestone	33x4		S. S. Dem.	Firestone
Nash, 682-4 & 5	Firestone	34x4½		S. S. Dem	Firestone Perlman
National, AL and AM	Opt	34x4½	S. S.	S. S.	Firestone
Nelson, D	Goodyear	32x4	S. S.	S. S. Dem	Kelsey
Oakland, 34-B	Goodyear	32x4	S. S.	Demountable	Perlman
Oldsmobile, T	Goodyear	35x5		19	Perlman
Oldsmobile, 37-A	Goodyear	32x4		19	Perlman
Oldsmobile, 45-B	Goodyear	34x4		25	Perlman
Olympian, 45	Miller	32x3½		S. S.	Perlman
Overland, 90	Fisk	31x4		No. 23 Solid Dem. Clincher	Stanweld
Overland, 90	Fisk	31x4		No. 23 Solid Dem. Clincher	Stanweld Co.
Packard, 325 & 335	Goodyear	34x4½	S. S.	Q. D. D.	Firestone
Paige, 6-55	Goodyear Firestone	35x4½	S. S.	S. S.	Kelsey
Paige, 6-40	Goodyear Firestone	33x4	S. S.	S. S.	Kelsey
Paterson, 6-46	Goodrich	33x4		Demountable	Baker
Peerless, 56	Goodyear Cord	34x4½		S. S.	Firestone
Phianna, R	U. S. Royal Cord	32x4½	S. S.	S. S. Q. Dem	Firestone
Piedmont		32x3½ 32x4		Demountable	
Pierce-Arrow, 48	Goodrich	35x5	S. S.	Q. D.	Firestone
Pilot, 6-45	Miller	32x4		S. S. Dem	Standardized
Premier, 6-C	Opt	32x4½	Opt	S. S.	Firestone
Reo	U. S.	34x4 33x4		S. S.	Firestone
Revere, All	Goodyear Goodrich	32x4½	Cord		Houk
Roamer, C-54	Goodyear Cord	32x4 32x4½	Front—Ribbed. Rear—A. W. T.	S. S.	Stanweld
Saxon, Y-18	Firestone	32x3½		S. S.	Firestone
Sayers, A. P.	Goodyear	32x4	S. S.	E	Firestone
Sayers, BP	Goodyear	33x4	S. S.	E	Firestone
Scripps-Booth	Goodyear	32x4		O. D.	Perlman
Seneca, H	Goodrich Miller	30x3½	Clincher	Clincher	Jackson
Singer, 19	Goodyear	35x5 33x5	S. S.		
Standard, H	Firestone	34x4½		Firestone	Firestone
Stanley	Firestone	34x4½	S. S.	Demountable	Firestone
Stearns, SKL-4	Goodyear	34x4½	S. S.	E Split	Firestone
Stephens, 80	Goodyear	32x4 33x4½	S. S.		Stanweld
Studebaker, EG-6	Goodyear	33x4½		S. S. Q. Dem.	Kelsey
Studebaker, EH-6	Goodrich	32x4		S. S. Q. Dem.	Kelsey
Studebaker, SH-4	Goodrich	32x3½		S. S. Q. Dem.	Kelsey

ABBREVIATIONS:
S. S.—Straight Side. Q. D. C.—Quick Demountable Clincher. Dem.—Demountable. Q. D. D.—Quick Demountable Detachable.

Motor Age Monthly Guide to Truck Specifications

These tables are revised and brought up to date monthly

Name and Mode	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl., Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
A. & B., 3T	3	.....	48x3½d	48x3½d	Own	4-5.17x4½	Bosch	none	none	Scheb.	none	Own	in-g.	Own	Gem.
A. & B., 5T	5	.....	48x3½d	48x5d	Own	4-5.17x4½	Bosch	none	none	Scheb.	none	Own	in-g.	Own	Gem.
Acason, R	1	.....	36x3½	36x5	Wauk.	4-3½x5½	Eise.	.....	Wauk.	Scheb.	Fuller	Fuller	worm	Timkn.	Ross
Acason, RB	1½	.....	36x3½	36x6	Wauk.	4-3½x5½	Eise.	.....	Wauk.	Scheb.	Fuller	Fuller	worm	Timkn.	Ross
Acason, H	2½	.....	36x4	36x7	Wauk.	4-4½x6½	Eise.	.....	Wauk.	Scheb.	B.&B.	Cotta	worm	Timkn.	Ross
Acason, L	3½	.....	36x5	40x5d	Wauk.	4-4½x6½	Eise.	.....	Wauk.	Scheb.	B.&B.	Cotta	worm	Timkn.	Ross
Acason, M	5	.....	36x6	40x6d	Wauk.	4-4½x6½	Eise.	.....	Wauk.	Scheb.	B.&B.	Cotta	worm	Timkn.	Ross
Acason, Tractor	6	.....	36x4	36x7	Wauk.	4-4½x5½	Eise.	.....	Wauk.	Scheb.	B.&B.	Cotta	worm	Timkn.	Ross
Acason, Tractor	10	.....	36x5	40x5d	Wauk.	4-4½x6½	Eise.	.....	Wauk.	Scheb.	B.&B.	Cotta	worm	Timkn.	Ross
Ace	1½	.....	34x3½	34x5	Buda	4-4½x5½	A-K	West.	Pierce	Scheb.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Ace	2½	.....	36x4	36x7	Buda	4-4½x5½	A-K	West.	Pierce	Scheb.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Acme, B	1	$2,075	34x3½	34x5	Cont.	4-3½x5	Eise.	G&D	Duplx.	Ray.*	B.&B.	Cotta	worm	Timkn.	Ross
Acme, F	1½	2,275	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	Duplx.	Ray.*	B.&B.	Cotta	worm	Timkn.	Ross
Acme, A	2	2,875	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	Duplx.	Ray.*	B.&B.	Cotta	worm	Timkn.	Ross
Acme, C	3½	3,875	36x5	40x5d	Cont.	4-4½x5½	Eise.	.....	Duplx.	Ray.*	B.&B.	Cotta	worm	Timkn.	Ross
Acme, E	5	4,975	36x6	40x6d	Cont.	4-4½x6	Eise.	.....	Cont.	Ray.*	B.&B.	Cotta	worm	Timkn.	Ross
Air-O-Flex, C	1½	.....	36x3½	36x5	Buda	4-3½x5½	Wag.	.....	Pharo	Strom.	B.&B.	B-Lipe	in-g.	Russel	Ross
All-American, AA	1	1,495	33x4*	32x4	H-S	4-3½x5	Simms	none	none	Strom.	B.&B.	G-Lees	in-g.	Torbn.	Ross
All-Power, SV4	3½	4,800	36x6	36x10	.....	4-4½x5½	Eise.	West.	Pharo	Zenith	Det.	Cotta	worm	Timkn.	Ross
Apex, C	1	1,395	33x4	32x3½	Buda	4-3½x5½	A-L	A-L	none	Strom.	Fuller	Fuller	in-g.	Torbn.	Lavn.
Apex, D	1½	1,595	32x3½	32x4	Buda	4-3½x5½	A-L	A-L	none	Strom.	Fuller	Fuller	in-g.	Torbn.	Lavn.
Apex, E	2½	2,450	36x4	36x6	Buda	4-4½x5½	Eise.	Eise.	Duplx.	Strom.	Fuller	Fuller	in-g.	Torbn.	Lavn.
Armleder, HW	2½	.....	36x4	36x4d	Cont.	4-4½x5½	Bosch	none	none	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Armleder, KW	3½	.....	36x5	36x5d	Cont.	4-4½x5½	Bosch	none	none	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Atco, IG-10	1	.....	34x4½	36x6	.....	4-3½x5½	.....	West.	.....	Strom.	Fuller	Fuller	in-g.	Torbn.	Ross
Atterbury, 7CX	2½	3,175	36x4	36x4d	Cont.	4-4½x5½	Eise.	none	Mon.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Atterbury, 7D	3½	3,975	36x5	40x5d	Cont.	4-4½x5½	Eise.	none	Mon.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Atterbury, 8E	5	5,475	36x5	40x6d	Cont.	4-4½x6	Eise.	Delco	Cont.	Zenith*	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Autocar, 21UF	2	2,300	34x4	34x5	Own	2-4½x4½	Bosch	none	none	Strom.	Own	Own	d-rd.	Own	Own
Autocar, UG21	2	2,400	34x4	34x5	Own	2-4½x4½	Bosch	none	none	Strom.	Own	Own	d-rd.	Own	Own
Available, H-2½	2½	3,250	36x4	36x8	Cont.	4-4½x5½	.....	.....	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Opt.	Opt.
Available, H-3	3	4,200	36x5	40x5d	Cont.	4-4½x5½	.....	.....	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Opt.	Ross.
Available, H-5	5	5,575	36x6	40x6d	Cont.	4-4½x6	.....	.....	none	Cont.	Zenith	B-Lipe	B-Lipe	worm	Opt.	Ross
Beck, 1-ton	1	1,550	34x3	34x3	Cont.	4-3½x5	Bosch	.....	Pierce	Strom.	Fuller	.....	in-g.	Clark	Lavn.
Beck, A	1½	1,750	34x3½	34x5	Cont.	4-3½x5	Bosch	.....	Pierce	Strom.	Fuller	.....	in-g.	Clark	Lavn.
Beck, B	1½	1,950	34x3½	34x6	Cont.	4-3½x5	Bosch	.....	Pierce	Strom.	Fuller	.....	in-g.	Clark	Lavn.
	2														
Beck, C	2	2,350	36x4	36x7	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	Fuller	.....	in-g.	Clark	Lavn.
	2½														
Beck, D	3	3,700	36x5	36x5d	Cont.	4-4½x5½	Bosch	.....	.....	.....	.....	.....	worm	Shel.	Lavn.
	3½														
Bell	1½	.....	32x3½	32x4	Buda	4-3½x5½	Eise.	.....	Duplx.	Strom.	B.&B.	.....	.....	Russel	.....
Bell, O	2½	.....	34x4	34x6	Buda	4-4½x5½	Eise.	.....	Duplx.	Strom.	B.&B.	.....	in-g.	Russel	Gem.
Belmont, AA	¾	1,150	31x4	31x4	.....	4-3½x5	Conn.	Dyn.	Pierce	Zenith	G-Lees	G-Lees	in-g.	Clark	Lavn.
Belmont, BB	1½	1,950	34x4½	36x5	Cont.	4-3½x5½	Eise.	Dyn.	Pierce	Zenith	G-Lees	G-Lees	in-g.	Clark	Lavn.
Bessemer, G	1	1,600	34x3	34x4	Cont.	4-3½x5	Bosch	Opt.	none	Ray.	Fuller	Fuller	in-g.	Torbn.	Ross
Bessemer, H-2	1½	2,085	36x3½	36x5	Cont.	4-3½x5	Bosch	Opt.	Pierce	Ray.	B.&B.	.....	in-g.	Torbn.	Ross
Bessemer, J-2	2½	2,785	36x4	36x4d	Cont.	4-4½x5½	Bosch	Opt.	Pierce	Ray.	B.&B.	B-Lipe	in-g.	Torbn.	Ross
Bessemer, K-2	4	4,285	36x5	36x10	Cont.	4-4½x5½	Bosch	Opt	Pierce	Ray.	B.&B.	B-Lipe	in-g.	Torbn.	Ross
Bethlehem, K	¾	1,495	34x4½	35x5	Own	4-3½x5	Bosch	G&D	none	Strom.	B.&B.	Det.	in-g.	Stan-P	Ross
Bethlehem, DG	1½	2,095	34x3½	34x5	Own	4-4x5½	A-K	G&D	Pierce	Strom.	B.&B.	Det.	in-g.	Russel	Lavn.
Bethlehem, EH	2½	2,495	34x4	34x6	Own	4-4x5½	A-K	G&D	Pierce	Strom.	B.&B.	Det.	in-g.	Russel	Lavn.
Bethlehem, FJ	3½	3,595	34x4	34x5d	Own	4-4½x5½	A-K	G&D	Pierce	Strom.	B.&B.	Det.	in-g.	Russel	Lavn.
Betz	2½	2,700	36x4	36x7	Buda	4-4½x5½	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Bollstrom, A	5	.....	36x6	36x6	Own	4-4½x5½	Bosch	none	.....	Strom.	.....	.....	in-g.	Own	Gem.
Brinton, H	1	1,500	33x4	33x4½*	Wis.	4-3½x5	.....	.....	.....	none	.....	.....	worm	Timkn.	Ross
Brinton, F	2½	3,400	36x4	36x7	Cont.	4-4½x5½	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Briscoe, T-34	1	.....	33x4	34x4	Own	4-3½x5	Conn.	A-L*	Own	Buick	Own	Own	in-g.	Russel	Lavn.
Brockway, S-2	1½	2,100	36x3	36x5	Cont.	4-3½x5	Eise.	none	none	Strom.	B-Lipe	B-Lipe	worm	Shel.	Gem.
Brockway, K-4	2½	3,000	36x4	36x7	Cont.	4-4½x5½	Eise.	none	none	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Brockway, R-2	3½	3,900	36x5	36x5d	Cont.	4-4½x5½	Eise.	none	none	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Brockway, T	5	5,000	36x5	40x6d	Cont.	4-4½x6	Eise.	.....	Duplx.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl., Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
Champion	3–5	1.000	32x4	32x4	Light	3½x4½	A-K	.....	none	.....	.....	.....	bevel	.....	.....
Chevrolet, T	1	.....	33x4	35x5*	Own	3½x5½	Remy	A-L*	Mon.	Zenith	Own	Warner	worm	Ind.	Warn
Clydesdale	1	.....	34x3½	34x5	Cont.	4-3½x5	Bosch	.....	Own	Zenith	B-Lipe	B-Lipe	worm	S.P.	Ross
Clydesdale, 42	1½	2,445	36x3½	36x6	Cont.	4-3½x5	Bosch	.....	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Clydesdale, 65X	2½	3,200	36x4	36x8	Cont.	4-4½x5½	Bosch	.....	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn	Ross
Clydesdale, 90	3½	4,075	36x5	40x10	Cont.	4-4½x5½	Bosch	.....	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Clydesdale, 120B.	5	5,025	36x6	40x12	Cont.	4-4½x6	Bosch	.....	Own	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Collier, 18	1	.....	34x4	34x5	Cont.	4-3½x5	Eise.	.....	Mon.	Zenith	Fuller	Fuller	worm	Chcgo.	Ross
Collier, 19	1½	.....	36x6	36x6	Cont.	4-3½x5	Eise.	.....	Mon.	Zenith	Fuller	Fuller	worm	Chcgo.	Ross
Collier, 20	2	.....	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	Mon.	Zenith	Fuller	Fuller	worm	Chcgo.	Ross
Columbia, F	1	1 750	34x3½	34x4	Cont.	4-3½x5	Dixie	.....	Pierce	Shake.	B.&B.	Covert	in-g.	Russel	Own
Columbia, H	1½	2,200	34x3½	34x5	Hink.	4-3½x5½	Bosch	.....	Hink.	Strom.	Det.	Covert	in-g.	Russel	.....
Columbia G	2½	2,750	36x4	36x7	Hink.	4-4 x5½	Bosch	Remy	Hink.	Strom.	Det.	Covert	in-g.	Russel	Own
Comet	1½	1,750	34x4	34x4	Lyc.	4-3½x5	Delco	Dneto.	.....	Carter	B.&B.	Muncie	worm	Chcgo.	.AS.
Commerce, E	1	1,590	34x3	34x4	Cont.	4-3½x5	Eise.	Bijur*	none	Zenith*	Det.	Det.	in-g.	Torbn.	Jacox.
Commerce, EP	2	1,965	36x6	36x6	Cont.	4-3½x5	Eise.	Bijur*	none	Zenith*	Det.	Det.	in-g.	Torbn.	wn
Concord, A	1½	2,350	36x3½	36x5	Buda	4-3½x5½	Eise.	.....	Mon.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Concord, B	2½	2,850	36x4	36x4d	Buda	4-4½x5½	Eise.	.....	Mon.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	oss
Conestoga, 12	½	.....	32x4½	32x4½	Cont.	4-3½x5	Simms	.....	.....	Strom.	B.&B.	Muncie	in-g.	Torbn.	C.A.S.
Conestoga, 20	1	2,100	34x3½	34x5	Cont.	4-3½x5	Simms	.....	.....	Strom.	Fuller	Fuller	worm	Wis.	Ross
Conestoga, 30	2	2,700	36x4	36x4d	Cont.	4-3½x5	Simms	.....	Dplx.	Strom.	Fuller	Fuller	worm	Wis.	Ross
Corbitt, E	1	2,200	34x3½	34x4	Cont.	4-3½x5	Eise.	Disco*	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Lavn.
Corbitt, D	1½	2,600	36x3½	36x5	Cont.	4-3½x5	Eise.	Disco*	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Ross
Corbitt, C	2	3,250	36x4	36x7	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Corbitt, B	2½	3,500	36x4	36x7	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Corbitt, A	3½	4,200	36x5	36x5d	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	H-Shaw	Cotta	worm	Shel.	Ross
Corbitt, AA	5	5,000	36x6	40x6d	Cont.	4-4½x6	Eise.	none	Pierce	Strom.	H-Shaw	Cotta	worm	Shel.	Ross
Dart, H	1	2,100	34x3½	34x5	Buda	4-3½x5½	Eise.	Bijur*	Pierce	Zenith	Fuller	Fuller	worm	Own	Ross
Dart, S	1½	2,250	34x3½	34x6	Buda	4-3½x5½	Eise.	Bijur*	Pierce	Zenith	Fuller	Fuller	worm	Own	Ross
Dart, M	2½	3,000	36x4	36x7	Buda	4-4½x5½	Eise.	Bijur*	Pierce	Zenith	Fuller	Fuller	worm	Own	Ross
Dart, W	3½	4,000	36x5	36x10	Buda	4-4½x6	Eise.	Bijur*	Pierce	Zenith	Fuller	Fuller	worm	Own	Ross
Day-Elder, A	1	1,925	34x3	34x4	Cont	4-3½x5	Eise.	.....	.....	Zenith	Covert	Covert	worm	Shel.	Ross
Day-Elden, B	1½	2,200	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	.....	Zenith	Covert	Covert	worm	Shel.	Ross
Day-Elder, D	2	2,600	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	Mon.	Zenith	Covert	Covert	worm	Shel.	Ross
Day-Elder, C	2½	2,850	36x4	36x7	Buda	4-4½x5½	Eise.	.....	Mon.	Zenith	Covert	Covert	worm	Shel.	Ross
Day-Elder, E	5	4,500	36x5	40x6d	Buda	4-4½x6	Eise	.....	Mon.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Day-Elder, F	3½	3,550	36x5	36x5d	Cont.	4-4½x5½	Eise.	.....	Mon.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Dearborn, F	1½	1,980	34x4	34x5	Cont.	4-3½x5	Bosch	.....	.....	Strom.	Fuller	Fuller	worm	Stand.	Lavn.
Dearborn, 48	2	2,390	34x4½	34x7	Buda	4-3½x5½	Bosch	.....	.....	Strom.	Fuller	Fuller	worm	Stand.	Det.
Defiance, D	1½	.....	35x5	36x6	Cont.	4-3½x5	.....	.....	none	Strom.	B &B.	G-Lees	in-g.	Torbn.	.....
Defiance, E	2	.....	35x5	38x7	Cont.	4-3½x5	.....	.....	none	Strom.	B.&B.	G-Lees	in-g.	Torbn.	Own
DeKalb, E-2	2	2,100	34x3½	36x5	Cont.	4-4½x5½	Eise.	none	none	Master	Fuller	Fuller	worm	Timkn.	Ross
DeKalb, E-2½	2½	2,600	36x4	36x6	Cont.	4-4½x5½	Eise.	none	none	Master	Fuller	Fuller	worm	Timkn.	Ross
Denby, 12	1	1,950	35x5	36x6	Cont.	4-3½x5	Eise.	none	Mon.	Strom.	Fuller	Fuller	in-g.	Russel	Ross
Denby, 134	2	2,450	36x3½	36x6	Cont.	4-3½x5	Eise.	none	Mon.	Strom	Fuller	Fuller	in-g.	Russel	Gem.
Denby, 25	3	3,250	36x4	36x7	Cont.	4-4½x5½	Eise.	none	Mon.	Strom.	Fuller	Fuller	in-g.	Russel	Gem.
Denby, 27	4	4,150	36x5	36x10	Cont.	4-4½x5½	Eise.	.....	Simplx.	Strom.	Own	Warner	in-g.	Clark	Ross
Denby, 210	5	4,900	36x6	40x12	Cont.	4-4½x5½	Eise.	Simp.	none	Simp.	Strom.	Warner	in-g.	Clark	Ross
Dependable	1½	2,150	34x3½	34x5	Buda	4-3½x5½	Dixie	.....	Pierce	Strom.	Fuller	Fuller	worm	Wis.	Ross
Dependable	2½	2,750	36x4	36x7	Buda	4-4½x5½	Dixie	.....	Pierce	Zenith	Fuller	Fuller	worm	Wis.	Ross
Diamond-T	1½	2,220	36x3½	36x5	.....	4-3½x5½	Bosch	.....	.....	Strom.	.....	.....	worm	.....	.....
Diamond-T, FS	1½	2,445	36x3½	36x5	.....	4-3½x5½	Bosch	.....	.....	Strom.	.....	.....	worm	.....	.....
Diamond-T, J4	1½	2,755	36x3½	36x5	Cont.	4-3½x5½	Bosch	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	.....	.....
Diamond-T, J3	2	3,185	36x4	36x7	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	.....	.....
Diamond-T, LB	3½	4,390	36x5	36x5d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	.....	.....
Diamond-T, R	5	5,190	36x6	40x6d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	.....	.....
Diamond-T, S	5	5,660	36x6	40x6d	Own	4-4½x6½	Bosch	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	.....	.....
Diehl, A	1	1,575	34x4½	35x5	Cont.	4-3½x5	Bosch	Presto	none	Zenith	B.&B.	Durstn	in-g.	Torbn.	Jacox.
Doane	2	3,750	36x5	36x7	Wauk.	4-4½x5½	Bosch	.....	.....	Master	B-Lipe	B-Lipe	Chain	Own	Own
Doane	6	5,825	36x6	40x6d	Wauk.	4-4½x6½	Bosch	none	Wauk.	Master	B-Lipe	.....	Chain	Own	Lavn.
Dodge	½	.....	32x3½	32x3½	Own	4-3½x4½	Own	N.E.	none	Stew.	Own	Own	.....	Own	Own
Dorris, K4	2	3,285	36x4	36x7	Own	4-4½x5½	Bosch	West.*	Own	Strom.	W.G.Co	W.G.Co	worm	Timkn.	Ross

Abbreviations: **Engine**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swartz; Bea., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf, Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite. **Electric Lighting**—Nlite, Nicolite; G&D, Gray & Davis; A-L, Auto-Lite; Dneto., Dyneto; Al-Ch., Allis-Chalmers; West, Westinghouse; L-N, Leece Neville; Det., Detroit; N-E, North East; Wag., Wagner; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Duplx., Duplex; Cont., Continental; Mon., Monarch; Simplx., Simplex; McCan., McCanna; Rugles., Ruggles. **Carburetor**—Scheb., Schebler; Strom., Stromberg; Ray., Rayfield; King., Kingston; Mon., Monarch; Shake., Shakespeare; Car., Carter; Flech., Fletcher; Holl., Holley; Ens., Ensign; Mast., Master; John., Johnson; Stew., Stewart; Till., Tillotson; Asterisk, vacuum fuel feed. **Clutch**—B.&B., Bork & Beck; B-Lipe Brown-Lipe; Det., Detroit; H-Shaw, Hele-Shaw; Mech., Mechanics; M&E, Merchant & Evans; Lyc., Lycoming; W. G. Co., Warner Gear Co. **Gearset**—B-Lipe, Brown-Lipe; G-Lees, Grant-Lees; Det., Detroit; Mech., Mechanics; Cover., Covert; Sabg., Savage Arms W. G. Co., Warner Gear Co. **Final Drive**—in-g., internal gear; d-rd., double reduction; s-bev., spiral bevel; ext-g., external gear. **Axle**—Timkn., Timken; Torbn., Torbenson; Key-H, Keystone-Hindley; Shel., Sheldon; Salsby., Salisbury; Ind., Industrial; Chcgo., Chicago-Standard; Chgo., Chicago; W-W., Walker-Weiss; Emp., Empire. **Steering Gear**—Gem., Gemmer; Lavn., Lavine; Warn., Warner; Ditw., Ditweiler; Jacx., Jacox; Fost., Foster; Wol., Wohlrab. **Tires**—Asterisk, pneumatic

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl., Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
Dorris, K7	3	4,200	36x5	36x10	Own	4-4½x5½	Bosch	West.*	Own	Strom.	W.G.Co	W.G.Co	worm	Timkn.	Ross
Douglas, C	1	1,800	34x4½	35x5	Buda	4-3½x5½	Eise.	none	Pierce	Scheb.	Fuller	.....	in-g.	Torbn.	Ross
Douglas, D	1½	2,100	35x5	36x6	Buda	4-4½x5½	Eise.	none	Pierce	Scheb.	Fuller	.....	in-g.	Torbn.	Ross
Douglas, E	2½	2,625	36x6	40x8	Buda	4-4½x5½	Eise.	none	Pierce	Scheb.	Fuller	.....	in-g.	Torbn.	Ross
Duplex Limited, A	1½	$2,575	35x5	38x7	Hink.	4-4x5¼	West.	West	.....	Strom.	Covert	Covert	Worm	Shel.	Ross
Economy, T-LHD	¾	1,250	35x5	35x5	Own	4-3¹¹⁄₁₆x5¼	A-L	A-L	none	none	Zenith	Warne	in-g	Torbn.	Jacox
Elmira, C	½	.....	28x3	28x3	Perk.	4-3¼x4	A-K	Carl.	none	Holl.*	Own	Own	bevel	Own	Own
Ellsworth															
Erie	1½	.....	34x3½	36x5	Buda	4-3¾x5	Bosch	.....	Pierce	Strom.	.....	.....	worm	Timkn.	.....
Erie	2	.....	34x3½	36x5	Buda	4-4½x5½	Bosch	.....	Pierce	Strom.	.....	.....	worm	Timkn.	.....
Erie	2½	.....	34x4	36x5	Buda	4-4½x5½	Bosch	.....	Pierce	Strom.	.....	.....	Worm	Timkn.	.....
Erie	3½	.....	36x5	40x5d	Buda	4-4½x5½	Bosch	.....	Pierce	Strom.	.....	.....	worm	Timkn.	.....
Fageol	1½	.....	34x3½	34x6	Lyc.	4-3½x5	Dixie	opt.	none	Tillot.	B.&B.	Own	worm	stand.	Ross
Fageol	2½	3,400	34x4	36x7	Wauk.	4-4½x5½	Dixie	opt.	Wauk.	Zenith	B-Lipe	Own	worm	Timkn.	Ross
Fageol	3½	4,500	36x5	36x5d	Wauk.	4-4½x6½	Dixie	opt.	Wauk.	Zenith	B-Lipe	Own	worm	Timkn.	Ross
Fageol	5	5,300	36x6	40x6d	Wauk.	4-4½x6½	Dixie	opt.	Wauk.	Zenith	B-Lipe	Own	worm	Timkn.	Ross
Famous, B-10	1	.....	36x3½	36x4	Cont.	4-3¾x5	Eise.	.....	Mon.	Strom.	Fuller	Fuller	in-g	Clark	Ross
Famous, B-12	1½	.....	36x3½	36x5	Cont.	4-3½x5	Eise.	.....	Mon.	Strom.	Fuller	Fuller	in-g	Clark	Ross
Fargo, P															
Federal, SD	1	2,500	35x5*	36x6*	Cont.	4-3½x5	Eise.	A-L	Pharo	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Federal, TE	1½	2,500	36x3½	36x5	Cont.	4-4½x5½	Eise.	opt.	Pharo	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Federal, UE	2	2,500	36x4	36x7	Cont.	4-4½x5½	Eise.	opt.	Pharo	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Federal, Trac	3	2,800	36x4	36x7	Cont.	4-4½x5½	Eise.	opt.	Pharo	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Federal, WD	3½	3,650	36x5	36x5d	Cont.	4-4½x5½	Eise.	opt.	Pharo	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Federal, XC	5	4,500	36x6	40x6d	Cont.	4-4½x5½	Eise.	opt.	Pharo	Zenith	B.&B.	Own	worm	Timkn.	Gem
Federal, Trac	7	3,825	36x5	36x5d	Cont.	4-4½x5½	Eise.	opt.	Pharo	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Ford, TT	1	550	30x3½*	32x4½	Own	4-3¾x4	Own	.....	.....	opt.	Own	Own	worm	Own	Own
Forschler	1	2,100	36x3	36x4	Cont.	4-3½x5	Bosch	.....	Duplx.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Forschler	1½	2,375	36x3½	36x5	Cont.	4-3½x5	Bosch	.....	Duplx.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Forschler	2	2,750	36x4	36x7	Cont.	4-4½x5½	Bosch	.....	Duplx.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Forschler	3	3,450	36x4	36x8	Cont.	4-4½x5½	Bosch	.....	Duplx	Zenith	Fuller	Fuller	worm	Shel.	Ross
F. W. D., B	3	4,500	36x6	36x6	Wis.	4-4½x5½	Eise.	.....	Pierce	Strom.	M.&E.	Cotta	bevel	Own	Ross
Fulton, FX	1½	1,850	34x3½	34x5	H-S	4-3¼x5⅛	Sims.	.....	.....	Carter	B.&B.	Own	in-g	Russel	Lavn.
Fulton, C	2	2,350	34x4	34x6	H-S	4-3½x5	Sims.	.....	.....	Carter	B.&B.	.....	in-g	Russel	Lavn
Gabriel, C	1	2,000	35x5	35x5	Buda	4-4½x5½	Bosch	L-N	none	Ray.	B.&B.	B-Lipe	worm	Timkn.	Gem.
Gabriel, E	2	3,250	36x4*	36x7*	Buda	4-4½x5½	Bosch	L-N	Duplx.	Ray.	B.&B.	B-Lipe	worm	Tim kn.	Gem.
Gabriel, F	4	4,300	36x5	40x6d*	Buda	4-4½x6	Bosch	L-N	Duplx.	Ray.	B.&B.	B-Lipe	worm	Timkn.	Gem.
Garford, 25	1½	2,090	36x3½	36x4	Buda	4-3½x5½	.....	West.	Mon.	Strom.	B-Lipe	Own	worm	Timkn.	Ross
Garford, 70-H	2	3,190	36x4	36x7	Buda	4-4½x5½	Split.	West.	Duplx.	Ray.	B-Lipe	Own	worm	Timkn.	Ross
Garford, 77-C	3½	4,300	36x5	40x5	.....	4-4½x5½	.....	.....	.....	.....	.....	.....	worm	.....	.....
Garford, 68	5	5,000	36x5	40x6d	Wis.	4-4½x5½	Eise.	West.	Duplx.	Ray.	B-Lipe	Own	chain	Own	Ross
Garford, 69	6	5,000	36x5	40x7d	Wis.	4-5⅛x5½	Eise.	West.	Duplx.	Ray.	B-Lipe	Own	chain	Own	Ross
Gary, F	1	2,100	36x3½	36x4	Buda	4-3½x5	Eise.	.....	McC.	Master	Fuller	Fuller	worm	Timkn.	Lavn.
Gary, GT	1½	2,550	36x3½	36x5	Buda	4-4x5½	Eise.	.....	McC.	Master	Fuller	Fuller	worm	Timkn.	Ross
Gary, J	2½	2,950	36x4	36x7	Buda	4-4½x5½	Eise.	.....	McC.	Master	B-Lipe	B-Lipe	worm	Timkn.	Ross
Gary, KT	3½	3,950	36x5	40x5d	Buda	4-4½x6	Eise.	.....	McC	Master	B-Lipe	B-Lipe	worm	Timkn.	Ross
Gary, M	5	5,050	36x6	40x6d	Buda	4-5x6½	Eise.	.....	McC.	Master	B-Lipe	B-Lipe	worm	Timkn.	Ross
Gersix, M	1½	2,850	36x3½	36x6	Buda	4-4x5½	Bosch	.....	Mon.	Strom	B.&B.	Cotta	worm	Own	Ross
Gersix, K	2½	3,350	36x4	36x7	Buda	4-4½x5½	Bosch	.....	Mon.	Strom.	B.&B.	Cotta	worm	Own	Ross
Gersix, L	3½	4,350	36x5	40x5d	Buda	4-4½x6	Bosch	.....	Mon.	Strom.	B.&B.	Cotta	worm	Own	Ross
Giant, 15	1	1,950	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	.....	Scheb.	B-Lipe	B-Lipe	worm	Shel.	Jacx.
Giant, 14	1½	2,375	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	.....	Scheb.	B-Lipe	B-Lipe	worm	Shel.	Jacx.
Giant., 16	2	2,850	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	.....	Scheb.	B-Lipe	B-Lipe	worm	Shel.	Ross
Giant, 17	3½	3,850	36x5	36x5d	Cont.	4-4½x5½	Eise.	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
G. M. C., 16	¾	.....	35x5*	35x5*	Cont.	4-3½x5	Eise.	.....	Mon.	Marvel	Own	Own	bevel	.....	Jacx.
G. M. C., 31	1½	.....	36x3½	36x5	Cont.	4-3½x5	Eise.	.....	Mon.	Marvel	Own	Own	worm	Timkn.	Jacx.
G. M. C., 41	2	.....	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	Mon.	Marvel	Own	Own	worm	Timkn.	Jacx.
G. M. C., 71	3½	.....	36x5	40x5d	Cont.	4-4½x5½	Eise.	.....	Mon.	Marvel	Own	Own	worm	Timkn.	Jacx.
G. M. C., 101	5	.....	36x6	40x6d	Cont.	4-4½x5½	Eise.	.....	Mon.	Marvel	Own	Own	worm	Timkn.	Jacx.
Graham, A	1½	2,295	35x5	36x6	Cont.	4-3¾x4	Eise.	.....	Mon.	Strom.	Fuller	Fuller	in-g	Torbn.	Lavn.
Gramm-Bernstein, 15	1½	.....	36x3½	36x5	Cont.	4-3¾x5	N.E	N. E.	.....	Strom.	Fuller	Fuller	worm	Clark	Ross
Gramm-Bernstein, 65	1½	.....	36x3½	36x5	Cont.	4-3¾x5	N. E.	N. E.	.....	Strom.	Own	Own	.....	Stan-P	Ross
Gramm-Bernstein, 20	2	.....	36x4	36x7	Cont.	4-4¼x5½	N. E.	N. E.	Pierce	Strom.	Fuller	Own	worm	Shel.	Ross
Gramm-Bernstein, 25	2½	.....	36x4	36x4	Hink.	4-4½x5½	Eise.	N. E.	Pierce	Strom.	Own	Own	.....	Stan-P	Ross
Gramm-Bernstein, 35	3½	.....	36x5	40x5d	Hink.	4-4½x5½	Eise.	N. E.	Hink.	Strom.	Own	Own	.....	Stan-P	Ross
Gramm-Bernstein, 50	5	.....	36x6	40x6d	Cont.	4-4½x6	Eise.	N. E.	Hink.	Strom.	Own	Own	.....	Stan-P	Ross
Grant, 10	1½	1,885	34x4½*	34x5	Cont.	4-3¾x5	Split.	Remy*	Pierce	Car.*	B.&B.	G-Lees	in-g	Torbn.	Jacx.
Grant, 11	1½	1,935	34x4½*	34x5	Cont.	4-3¾x5	Split.	Remy*	Pierce	Car.*	B.&B.	G-Lees	in-g	Torbn.	Jacx.
Grant, 15	2	2,150	34x4	34x6	Cont.	4-3¾x5	Split.	Remy*	Pierce	Car.*	B.&B.	G-Lees	in-g	Torbn.	Jacx.
Grant, 16	2	2,250	34x4	34x6	Cont.	4-3¾x5	Split.	Remy*	Pierce	Car.*	B.&B.	G-Lees	in-g.	Torbn.	Jacx.
Hahn, J-4	1	.....	36x3½	36x5	Cont.	4-3¾x5	Opt.	.....	Pierce	Opt.	B-Lipe	B-Lipe	worm	Shel.	Ross
Hahn, CD	1½	.....	36x3½	36x6	Cont.	4-4½x5½	Opt.	.....	Pierce	Opt.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Hahn, DE	2	.....	36x4	36x7	Cont.	4-4½x5½	Opt.	.....	Pierce	Opt.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Hahn, EE	2½	.....	36x4	36x8	Cont.	4-4½x5½	Opt.	.....	Pierce	Opt.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Hahn F	3½	.....	36x5	36x10	Cont.	4-4½x5½	Cpt.	.....	Pierce	Opt.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Hahn FE	5	.....	36x6	40x12	Cont.	4-4½x6	Opt.	.....	Pierce	Opt.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Hal-Fur D	1	2,000	35x5	35x5	Buda	4-4x5	Bosch	West.	Duplx.	Strom.	B.&B.	B-Lipe	worm	Timkn.	Gem.
Hal-Fur E	2½	2,750	35x5	36x7	Buda	4-4½x5½	Bosch	none	Duplx.	Strom.	B.&B.	B-Lipe	worm	Timkn.	Gem.
Hall	2	2,875	36x4	36x4d	Cont.	4-4½x5½	Bosch	.....	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Hall	3½	3,750	36x5	36x5d	Cont.	4-4½x5½	Bosch	.....	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Hall	5	4,850	36x5	40x6d	Cont.	4-4½x5½	Bosch	.....	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Hall	7	4,850	36x5	40x6d	Cont.	4-4½x5½	Bosch	.....	Duplx.	Zenith	B-Lipe	B-Lipe	chain	Timkn.	Gem.
Harvey WEA	1½	2,350	34x3½	34x5	Buda	4-4½x5½	Bosch	.....	Mon.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Harvey WFA	2½	3,300	36x4	36x7	Buda	4-4½x5½	Eise.	.....	Duplx.	Strom.	B.&B.	B-Lipe	worm	Shel.	Ross
Harvey WHA	3½	4,300	36x5	36x5d	Buda	4-4½x6	Eise.	.....	Duplx.	Strom.	B.&B.	B-Lipe	worm	Shel.	Ross
Harvey WKA	5	5,000	36x6	40x6d	Buda	4-4½x6	Eise.	.....	Duplx	Strom.	B.&B.	B-Lipe	worm	Shel.	Ross
Hawkeye K	1½	1,995	34x3½	34x5	Buda	4-3½x5½	Eise.	.....	Simplx.	Zenith	Fuller	Fuller	in-g.	Clark	Ross
Hawkeye M	2	2,650	36x4	36x6	Buda	4-4½x5½	Eise.	West.	simplx.	Zenith	Fuller	Fuller	in-g.	Clark	Ross
Hendrickson	2½	3,200	36x4	36x7	Buda	4-4½x5½	.....	.....	.....	Stom.	Fuller	.....	worm	Timkn.	Ross
Hendrickson	3½	4,000	36x5	36x5d	Buda	4-4½x5½	.....	.....	.....	Strom.	Fuller	.....	worm	Timkn.	Ross
Hendrickson	5	5,250	36x6	40x6	.....	4-5x6	.....	.....	.....	Strom.	.....	.....	worm	Timkn.	Ross
Highway Kn't A	4	4,800	36x5	36x6	Knight	4-4x6	Eise.	Wag.	Mon.	Zenith	.....	.....	worm	Shel.	.....
Highway Kn't	5	5,600	36x5	40x6d	Knight	4-4x6	Eise.	Wag.	Mon.	Zenith	.....	.....	worm	Shel.	.....
Higrade															
Higrade															
Hoover															
Huffman C	1½	1,495	34x3½	34x6	Buda	4-3½x5	Dixie	.....	.....	Zenith	Fuller	Fuller	worm	Torbn.	Lavn.
Huffman, B	1½	1,695	34x3½	34x6	Cont.	4-3½x5	Dixie	.....	.....	Zenith	Fuller	Fuller	worm	Chgo.	Lavn.
Hurlburt, A	1½	2,850	34x4	34x5	Buda	4-4½x5½	Eise.	Vesta	Duplx.	Flech.	B-Lipe	B-Lipe	worm	Own	Ross
Hurlburt, B	2½	3,750	36x4	36x4d	Buda	4-4½x5½	Eise.	Vesta	Duplx.	Flech.	B-Lipe	B-Lipe	worm	Own	Ross
Hurlburt, C	3½	4,400	36x5	36x5d	Buda	4-4½x6	Eise.	Vesta	Duplx.	Flech.	B-Lipe	B-Lipe	worm	Own	Ross
Hurlburt, D	5½	5,250	36x5	40x6	Buda	4-4½x6	Eise.	Vesta	Duplx.	Flech.	B-Lipe	B-Lipe	worm	Own	Ross
I. H. C., H	¾	.....	36x3½	36x3½	Own	4-3½x5½	Bosch	N-E*	Own	Holl.	Own	Own	in-g.	Own	Own
I. H. C., F	1	.....	36x3½	36x4	Own	4-3½x5½	Bosch	N-E*	Own	Holl.	Own	Own	in-g.	Own	Own
I. H. C., K	1½	.....	36x3½	36x5	Own	4-3½x5¼	Bosch	N-E*	Own	Holl.	Own	Own	in-g.	Own	Own
I. H. C., G	2	.....	36x4	36x6	Own	4-4x5	Split.	N-E*	Own	Ens.*	Own	Own	in-g.	Own	Own
I. H. C., L	3½	.....	36x5	40x10	Own	4-4½x5	Split.	N-E	Own	Ens.*	Own	B-Lipe	in-g.	Own	Own
Independent, F	1-2	.....	36x3½	36x5	Cont.	4-3¾x5	Eise.	.....	Pierce	Scheb.	Fuller	Fuller	worm	Wis.	Ross
Indiana, 12	1½	.....	34x3½	34x5	Wauk.	4-3¾x5½	Eise.	West.	Wauk.	Strom.	B.&B.	Covert	worm	Shel.	Wol.
Indiana, 20	2	.....	36x4	36x7	Ruten.	4-4½x5½	Eise.	West.	Pierce	Strom.	B.&B.	B-Lipe	worm	Shel.	Wol.
Indiana, 25	2½	.....	36x4	36x8	.....	4-4½x5½	.....	.....	.....	.....	.....	.....	worm	.....	.....
Indiana, 35	3½	.....	36x5	36x5d	Ruten.	4-4½x5½	Eise.	West.	Pierce	Strom.	B.&B.	B-Lipe	worm	Shel.	Wol.
Indiana, 50	5	.....	36x5	40x6d	Wauk.	4-4½x6½	Eise.	West.	Wauk.	Strom.	B.&B.	B-Lipe	worm	Shel.	Wol.
Jackson, C	3½	4,250	36x7	36x7	Cont.	4-4½x5½	Eise.	Eise.	Pierce	Strom.	B.&B.	Own	bevel	Own	Ross
Jumbo, 15	1½	2,595	36x3½	36x5	Buda	4-3½x5½	N-E	.....	none	Zenith	Fuller	Fuller	in-g.	Clark	Jacx.
Jumbo, 20	2	2,795	35x5	38x7	Buda	4-3½x5½	N-E	.....	none	Zenith	Fuller	Fuller	in-g.	Clark	Jacx.
Jumbo, 25	2½	3,095	36x4	36x7	Buda	4-4½x5½	Eise.	.....	Duplex.	Zenith	Fuller	Fuller	in-g.	Clark	Jacx.
Jumbo, 30	3	3,590	36x6	42x9	Buda	4-4½x5½	Eise.	.....	Duplx.	Zenith	Fuller	Fuller	in-g.	Clark	Jacx.
Jumbo, 35	3½	4,300	36x5	36x10	Buda	4-4½x6	Eise.	.....	Simplx.	Zenith	B-Lipe	B-Lipe	in-g.	Clark	Jacx.
Jumbo, 40	4	4,875	38x7	44x10	Buda	4-4½x6	Eise.	.....	Simplx.	Zenith	B-Lipe	B-Lipe	in-g.	Clark	Jacx.
Kalamazoo, G	1½	.....	34x4	34x5	Cont.	4-3¾x5	Conn.	Dneto.	Pierce	Strom.	Fuller	Fuller	worm	Wis.	Ross
Kalamazoo, H	2½	.....	34x5	36x7	Cont.	6-3½x5½	Conn.	Dneto.	Pierce	Strom.	Fuller	Fuller	worm	Wis.	Ross
Kalamazoo, K	3½	.....	36x5	36x5d	Cont.	6-3½x5½	Conn.	Dneto.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Ross
Kankakee, E	2½	2,875	34x4	36x6	Cont.	6-3½x5½	Delco	Delco	.....	Zenith	Muncie	Muncie	in-g.	Russel	Ross

Abbreviations: Engine—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swarts; Bea., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf, Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite. **Electric Lighting**—Nlite, Nicolite; G&D, Gray & Davis; A-L, Auto-Lite; Dneto., Dyneto; Al-Ch., Allis-Chalmers; West., Westinghouse; L-N, Lecce-Neville; Det., Detroit; N-E, North East; Wag., Wagner; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Duplx., Duplex; Cont., Continental; Mon., Monarch; Simplx., Simplex; McCan., McCanna; Rugles., Ruggles. **Carburetor**—Scheb., Schebler; Strom., Stromberg; Ray., Rayfield; King., Kingston; Mon., Monarch; Shake., Shakespeare; Car., Carter; Flech., Fletcher; Holl., Holley; Ens., Ensign; Mast., Master; John., Johnson; Stew., Stewart; Till., Tillotson; Asterisk, vacuum fuel feed. **Clutch**—B.&B., Bork & Beck; B-Lipe Brown-Lipe; Det., Detroit; H-Shaw, Hele-Shaw; Mech., Mechanics; M&E, Merchant & Evans; Lyc., Lycoming; W. G. Co., Warner Gear Co. **Gearset**—B-Lipe, Brown-Lipe; G-Lees, Grant-Lees; Det., Detroit; Mech., Mechanics; Cover., Covert; Sabg., Savage Arms; W. G. Co., Warner Gear Co. **Final Drive**—in-g., internal gear; d-rd., double reduction; s-bev., spiral bevel; ext-g., external gear. **Axle**—Timkn., Timken; Torbn., Torbenson; Key-H, Keystone-Hindley; Shel., Sheldon; Salsby., Salisbury; Ind., Industrial; Chgo., Chicago-Standard; Chgo., Chicago; W-W., Walker-Weiss; Emp., Empire. **Steering Gear**—Gem., Gemmer; Lavn., Lavine; Warn., Warner; Ditw., Ditweiler; Jacx., Jacox; Fost., Foster; Wol., Wohlrab. **Tires**—Asterisk, pneumatic.

Motor Age Monthly Guide to Truck Specifications—Concluded

These tables are revised and brought up to date monthly

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl., Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
Kearns	¾	1,350	32x4½	32x4½	Light	4-3½x4½	Berl.	Dyn.	Mon.	Zenith	B.&B.	G-L	in-g.	Torbn.	Lavn.
Kearns	1½	2,000	34x3½	34x6	H-S	4-3½x5	Berl.	none	Pierce	Zenith	B.&B.	G-L	in-g.	Torbn.	Lavn.
Keldon, 19	2	2,885	36x4	36x7	Buda	4-4½x5½	Eise.	none	Pierce	Strom.	Fuller	Fuller	in-g.	Russel	Ross
Kelly-S., K-31	1½	3,000	36x3½	36x6	Own	4-3½x5½	Eise.	opt.*	Pierce	Zenith	Own	Covert	Chain	Own	Gem.
Kelly-S., K-32	1½	3,000	36x3½	36x6	Own	4-3½x5½	Eise.	opt.*	Pierce	Zenith	Own	Covert	worm	Own	Gem.
Kelly-S., K-35	2½	3,500	36x4	36x4d	Own	4-3½x5½	Eise.	opt.*	Pierce	Zenith	Own	Covert	Chain	Own	Gem.
Kelly-S., K-36	2½	3,500	36x4	36x4d	Own	4-3½x5½	Eise.	opt.*	Pierce	Zenith	Own	Covert	worm	Own	Gem.
Kelly-S., K-40	3½	4,400	36x4	40x5d	Own	4-4½x6½	Eise.	opt.*	Pierce	Zenith	Own	Covert	worm	Own	Gem.
Kelly-S., K-45	4	4,500	36x5	40x6d	Own	4-4½x6½	Eise.	opt.*	Pierce	Ray.	Own	Covert	Chain	Own	Gem.
Kelly-S., K-50	5	5,150	36x6	40x6d	Own	4-4½x6½	Eise.	opt.*	Pierce	Ray.	Own	Covert	Chain	Own	Gem.
Kelly-S., K-60	6	5,500	36x6	40x7d	Own	4-4½x6½	Eise.	opt.*	Pierce	Ray.	Own	Covert	Chain	Own	Gem.
Keystone, 40	2	2,200	35x5	36x6	Own	4-4½x5½	Berl.	none	Pierce	Zenith	Fuller	Fuller	in-g.	Russel	Ditw.
Kimball, AB	2	3,675	36x5	36x7	Wis.	4-4 x6	Eise.	Split.	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Kimball, AC	2½	3,975	36x6	38x7	Wis.	4-4½x6	Eric.	Split.	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Kimball, AK	3	4,475	36x4	36x10	Wis.	4-4½x6	Eise.	Split.	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Kimball, AE	4	4,975	36x5	40x10	Wis.	4-4½x6	Eise.	Split.	Duplx.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Kimball, AF	5	5,975	36x6	40x12	Wis.	4-5 x6	Eric.	Split.	Duplx.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Kissel	¾	1,875	34x4½*	34x4½	Own	4-3½x5½	Eise.	.....	Pierce	Strom.	W.G.Co	W.G.Co	worm	Own	Jacx.
Kissel	1½	2,975	34x3½	34x5	Own	4-3½x5½	Eise.	*	Pierce	Strom.	W.G.Co	W.G.Co	worm	Shel.	Jacx.
Kissel	2	2,975	34x4	36x7	Own	4-4½x5½	Eise.	*	Pierce	Strom.	W.G.Co	W.G.Co	worm	Timkn.	Lavn.
Kissel	3½	3,975	36x5	36x5d	Own	4-4½x5½	Eisc.	*	Pierce	Strom.	W.G.Co	W.G.Co	worm	Shel.	Ross
Kissel	5	4,785	36x6	36x6d	Own	4-4½x5½	Eisc.	*	Pierce	Strom.	W.G.Co	W.G.Co	worm	Shel.	Ross
Kleiber, AA	1	.....	34x3½	34x5	Cont.	4-3½x5½	Bosch	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Kleiber, A	1½	.....	36x3½	36x6	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	H-Shaw	B-Lipe	worm	Shel.	Ross
Kleiber, BB	2	.....	36x4	36x3½d	Cont	4-4½x5½	Bosch	.....	Pierce	Strom.	H-Shaw	B-Lipe	worm	Timkn.	Ross
Kleiber, B	2½	.....	36x5	36x4d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	H-Shaw	B-Lipe	worm	Shel.	Ross
Kleiber, C	3½	.....	36x5	36x5d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	H-Shaw	B-Lipe	worm	Timkn.	Ross
Knox, 35-Tractor	...	5,500	36x5	38x6d	Own	4-5 x5½	Eise.	G.&D.	None	Zenith	Own	Own	Chain	Own	Ross
Koehler, C	1½	1,885	34x3	34x5	H-S	4-3½x5	Eise.	none	Simplx.	Zenith	Own	Own	Chain	Own	Ross
Koehler, M	2½	3,165	36x4	36x7	Herc.	4-4 x5½	Eise.	none	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Koehler Trac.,MT	5	3,250	36x4	36x7	Herc.	4-4 x5½	Eise.	none	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Larrabee, U	1½	2,250	34x3½	34x5	Cont.	4-3½x5	Bosch	.....	Simplx.	Scheb.	B-Lipe	B-Lipe	worm	Shel.	Ross
Larrabee, EK&SK	2½	3,250	36x4	36x7	Cont.	4-4½x5½	Bosch	.....	Simplx.	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Larrabee, EL & SL	3½	4,000	36x5	36x5d	Cont.	4-4½x5½	Bosch	.....	Simplx.	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Larrabee,SW&EW	5	4,900	36x5	40x6d	Cont.	4-4½x5½	Bosch	.....	Simplx.	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
L. M. C	2½	.....	36x4	36x4d	Cont.	4-4½x5½	Bosch	.....	Simplx.	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Loyal	¾	950	32x4	32x5	LeRoi	4-3½x4½	A-K	W-L	.....	Strom.	B.&B.	.....	in-g.	Russel	.....
Loyal, Special	¾	1,245	32x4½	32x4½	H-S	4-3½x5	A-K	.....	.....	Strom.	B.&B.	Covert	in-g.	Torbn.	Ross
Loyal	1	1,500	33x5	33x5	H-S	4-3½x5	A-K	W-L	.....	Strom.	B.&B.	Covert	in-g.	Torbn.	Ross
Mack, AB	1½	3,000	36x4	36x3½d	Own	4-4 x5	Dixie	.....	Own	Zenith	B-Lipe	B-Lipe	Chain	Own	Gem.
Mack, AB	1½	3,000	36x4	36x3½d	Own	4-4 x5	Dixie	.....	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Mack, AB	2	3,300	36x4	36x4d	Own	4-4 x5	Dixie	.....	Own	Zenith	B-Lipe	B-Lipe	Chain	Own	Gem.
Mack, AB	2	3,300	36x4	36x4d	Own	4-4 x5	Dixie	.....	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Mack Trac., AB	5	3,400	36x4	36x4d	Own	4-4 x5	Dixie	.....	Own	Zenith	B-Lipe	B-Lipe	Chain	Own	Gem.
Mack, AC	3½	4,950	36x5	40x5d	Own	4-5 x6	Dixie	.....	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Mack, AC	5	5,500	36x6	40x6d	Own	4-5 x6	Dixie	.....	Own	Zenith	Own	Own	Chain	Own	Gem.
Mack, AC	6½	5,750	36x6	40x6d	Own	4-5 x6	Dixie	.....	Own	Zenith	Own	Own	Chain	Own	Gem.
Mack Trac., AC	7	4,950	36x5	40x7d	Own	4-5 x6	Dixie	.....	Own	Zenith	Own	Own	Chain	Own	Gem.
Mack, AC	7½	6,000	36x7	40x7d	Own	4-5 x6	Dixie	.....	Own	Zenith	Own	Own	Chain	Own	Gem.
Mack Trac., AC	10	5,500	36x6	40x6d	Own	4-5 x6	Dixie	.....	Own	Zenith	Own	Own	Chain	Own	Gem.
Mack Trac., AC	13	5,750	36x6	40x6d	Own	4-5 x6	Dixie	.....	Own	Zenith	Own	Own	Chain	Own	Gem.
Mack Trac., AC	15	6,000	36x7	40x7d	Own	4-5 x6	Dixie	.....	Own	Zenith	Own	Own	Chain	Own	Gem.
Master, JI	1½	2,190	34x3½	34x5	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	Fuller	Fuller	in-g.	Torbn.	Ross
Master, JW	1½	2,290	34x3½	34x5	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	Fuller	Fuller	worm	Timkn.	Ross
Master, M	2	2,590	34x4	36x7	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	B-Lipe	B-Lipe	in-g.	Torbn.	Ross
Master, O	2	2,690	34x4	36x7	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	B-Lipe	B-Lipe	in-g.	Torbn.	Ross
Master, W	2	2,890	34x4	36x7	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Master, WL	2	2,990	34x4	36x7	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Master, A	3½	3,990	36x5	40x5d	Buda	4-4½x6	Eise.	opt.	Pierce	Mast.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Master, B	5	4,990	36x6	40x6d	Buda	4-4½x6½	Eise.	opt.	Pierce	Mast.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Master Trac., T	6	2,850	34x4	36x4d	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	B-Lipe	B-Lipe	in-g.	Torbn.	Ross

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl., Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
Maxwell	1½	1,310	32x3	32x4	Own	4-3¾x4½	A-K	A-L	Own	Spec.	Own	Own	worm	Own	Own
Menominee, Hurryton	1	2,080	34x3½	34x5	Wis.	4-3½x5	Eise.	.....	Mon.	Strom.	Fuller	Fuller	worm	Wis.	Ross
Menominee, H	1½	2,725	36x3½	36x5	Wis.	4-4 x5	Eise.	.....	Mon.	Strom.	Fuller	Fuller	worm	Wis.	Ross
Menominee, D	2	3,245	36x4	36x4d	Wis.	4-4 x6	Eise.	.....	Mon.	Strom.	Fuller	Fuller	worm	Wis.	Ross
Menominee, G	3½	4,270	36x5	36x5d	Cont	4-4½x5½	Eise.	.....	Mon.	Strom.	B.&B.	Cotta	worm	Timkn.	Ross
Menominee, J	5	5,450	36x6	40x6d	Wis.	4-4½x5½	Eise.	.....	Mon.	Strom.	B.&B.	Cotta	worm	Timkn.	Ross
Modern	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Moreland, 19-B	1½	2,930	36x3½	36x5	Cont.	4-4½x5½	Dixie	.....	.....	Miller	Own	Own	worm	Timkn.	Ross
Moreland, 19-C	2½	3,775	36x4	36x7	Cont.	4-4½x5½	Dixie	.....	.....	Miller	Own	Own	worm	Timkn.	Ross
Moreland, 19-G	4	4,875	36x5	40x5d	Cont.	4-4½x6	Dixie	.....	Cont.	Miller	Own	Own	worm	Timkn.	Ross
Moreland, 19-J	5	5,350	36x6	40x6d	Cont.	4-4½x6	Dixie	.....	Cont.	Miller	Own	Own	worm	Timkn.	Ross
Muskegon, 20	2	2,325	36x4	36x6	Cont.	4-4½x5½	Eise.	.....	Pierce	Detroit	Fuller	Fuller	in-g.	Torbn.	Lavn
Mutual	2	3,375	36x4	36x8	Wis.	4-4½x6	Bosch	West.	Duplx.	Strom.	H-Shaw	Fuller	worm	Wis.	Ross
Mutual	3½	.....	36x5	.....	Wis.	4-4½x5½	Bosch	West.	Duplx.	Strom.	H-Shaw	Warner	worm	Wis.	Ross
Mutual	5	.....	36x6	.....	Wis.	4-5.1x5½	Bosch	West.	Duplx.	Strom.	H-Shaw	Warner	worm	Wis.	Ross
Napoleon, 9	1	1,385	32x3½	32x4	Gray	4-3½x5	Conn.	A-L	.....	Strom.	Fuller	Fuller	in-g.	Clark	Lavn.
Napoleon, 11	1½	1,660	34x4	34x5	Gray	4-3½x5	Conn.	A-L	.....	Strom.	Fuller	Fuller	in-g.	Clark	Lavn.
Nash, 2018	1	1,650	34x3	34x3	Own	4-3½x5½	Eise.	A-L	Simplx.	Strom.	B.&B.	Detroit	in-g.	Clark	Jacx.
Nash, 3018	1½	2,250	34x4	36x6	Own	4-3½x5½	Eise.	A-L	Simplx.	Strom.	B.&B.	Detroit	in-g.	Clark	Jacx.
Nash, 4017	2	3,250	36x5	36x5	Buda	4-4½x5½	Eise.	none	Simplx.	Strom.	B.&B.	Own	in-g.	Own	Lavn.
Nelson&LeM.,F1½	1½	.....	36x3½	36x5	Cont.	4-4½x5½	Bosch	West.	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Nelson & LeM.,F2	2	.....	36x4	36x7	Cont.	4-4½x5½	Bosch	West.	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Nelson&LeM.,F3½	3½	.....	36x5	36x5d	Cont.	4-4½x5½	Bosch	West.	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Nelson&LeM,FC5	5	.....	36x6	40x6d	Cont.	4-4½x6	Bosch	West.	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Netco, D	2	3,000	36x4	36x6	Cont.	4-4½x5½	Eise.	none	.....	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Netco, H	2½	3,400	36x4	36x7	Cont.	4-4½x5½	Eise.	none	none	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Noble, A-20	1	.....	36x3½	36x4	Buda	4-3½x5½	Eise.	Eise.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Lavn.
Noble, B-30	1½	.....	36x3½	36x5	Buda	4-3½x5½	Eise.	Eise.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Lavn.
Noble, C-40	2	.....	36x4	36x7	Buda	4-4 x5½	Eise.	Eise.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Lavn.
Noble, D-50	2½	.....	36x4	36x8	Buda	4-4½x5½	Eise.	Eise.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Lavn
Noble, E-70	3½	.....	36x5	36x10	Buda	4-4½x6	Eise.	Eise.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Lavn.
Northway, B-2	2	3,250	36x4	36x4d	Own	4-4 x6	Wag.	West.	Pierce	Scheb.	Fuller	Fuller	worm	Shel.	Ross
Northway, B-3½	3½	4,250	36x5	40x5d	Own	4-4 x6	Wag.	West.	Pierce	Scheb.	Fuller	Fuller	worm	Shel.	Ross
O. K	1½	2,450	36x4	36x5	Buda	4-4½x5½	Eise.	none	Pierce	Zenith	Muncie	Muncie	worm	Chcgo.	Ross
O. K	2½	3,150	36x4	36x8	Buda	4-4½x5½	Eise.	none	Pierce	Zenith	Fuller	Fuller	worm	Wis.	Ross
O. K	3½	4,100	36x5	36x10	Buda	4-4½x6	Eise.	none	Pierce	Zenith	Fuller	Fuller	worm	Wis.	Ross
Old Hickory, W	1¼	2 175	36x3½	36x4	Cont.	4-3½x5	Eise.	.....	Pierce	Strom.	B.&B.	G-Lees	worm	Timkn.	Lavn.
Oldsmobile	¾	1,250	35x5*	35x5*	Own	4-3¼x5½	A-L	A-L	.....	Zenith	.....	.....	in-g.	Torbn.	Jacx.
Old Reliable, A	1½	2,350	34x3½	36x6	Wis.	4-4 x5	Bosch	opt.	Mon.	Ray.*	B-Lipe	B-Lipe	worm	Shel.	Ross
Old Reliable, B	2½	3,500	36x4	36x4d	Wis.	4-4½x6	Bosch	opt.	Mon.	Ray.	Fuller	Fuller	worm	Shel.	Ross
Old Reliable, C	3½	4,250	36x5	36x5d	Wis.	4-4½x5½	Bosch	opt.	Mon.	Ray.	Univ.	Savg.	worm	Shel.	Ross
Old Reliable, D	5	5,250	36x6	40x6d	Wis.	4-5.1x5½	Bosch	opt.	Duplx.	Strom.	Univ.	Savg.	worm	Shel.	Ross
Old Reliable, K, L & M	7½	6,250	36x6	40x7d	Wauk.	4-4½x6½	Bosch	none	Wauk.	Strom.	Univ.	Savg.	Chain	Shel.	Ross
Oneida, A	1½	2,290	36x3½	36x5	Cont.	4-3½x5½	Bosch	West.	Pierce	Strom.	H-Shaw	Cotta	worm	Timkn.	Ross
Oneida, B	1½	2,600	36x3½	36x6	Cont.	4-4½x5½	Bosch	West.	Pierce	Strom.	H-Shaw	Cotta	worm	Timkn.	Ross
Oneida, C	2½	3,000	36x4	36x7	Cont.	4-4½x5½	Bosch	West.	Pierce	Strom.	H-Shaw	Cotta	worm	Timkn.	Ross
Oneida, D	3½	3,700	36x5	36x10	Cont.	4-4½x5½	Bosch	West.	Pierce	Strom.	H-Shaw	Cotta	worm	Timkn.	Ross
Oneida, E	5	4,750	36x6	40x12	Cont.	4-5½x5½	Bosch	West.	Pierce	Strom.	H-Shaw	Cotta	worm	Timkn.	Ross
Oshkosh	2	3,500	36x6*	36x6*	H-S.	4-3½x5	N.E.	N.E.	Duplx.	Zenith	B-Lipe	B-Lipe	bevel	Own	Ross
Packard, E	1½	3,200	34x3½	34x3½d	Own	4-4 x5½	Dixie	Bijur*	Own	Own	Own	Own	worm	Own	Own
Packard, E	2	3,600	34x4	34x4d	Own	4-4 x5½	Dixie	Bijur*	Own	Own	Own	Own	worm	Own	Own
Packard, E	3	4,350	36x5	36x5d	Own	4-4½x5½	Dixie	Bijur*	Own	Own	Own	Own	worm	Own	Own
Packard, E	4	4,550	36x5	40x5d	Own	4-4½x5½	Dixie	Bijur*	Own	Own	Own	Own	worm	Own	Own
Packard, E	5	5,450	36x6	40x6d	Own	4-5 x5½	Dixie	Bijur*	Own	Own	Own	Own	worm	Own	Own
Packard, E	6	5,700	36x6	40x7d	Own	4-5 x5½	Dixie	Bijur*	Own	Own	Own	Own	worm	Own	Own
Paige, 50-18	2½	3,150	36x4	36x4d	Cont.	4-4½x5½	Bosch	none	Duplx.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Jacx.
Paige, 51-18	3½	.....	36x5	36x5d	Cont.	4-4½x5½	Bosch	none	Duplx.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Jacx

Abbreviations: **Engine**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A.,North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swartz; Bea., Beaver. **Ignition**—Eise., Eisemann, A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf, Conn., Connecticut; Lau., Lauraine; Berl., Berling; A L, Auto-Lite. **Electric Lighting**—Nlite, Nicolite; G&D, Gray & Davis; A-L Auto-Lite; Dneto., Dyneto; Al-Ch., Allis-Chalmers; West., Westinghouse; L-N, Leece Neville; Det., Detroit; N-E, North East; Wag., Wagner; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Duplx., Duplex; Cont., Continental; Mon., Monarch; Simplx., Simplex; McCan., McCanna; Rugles., Ruggles. **Carburetor**—Scheb., Schebler; Strom. Stromberg; Ray., Rayfield; King., Kingston; Mon., Monarch; Shake., Shakespeare; Car., Carter; Flech., Fletcher; Holl., Holley; Ens., Ensign; Mast., Master; John., Johnson; Stew., Stewart; Till., Tillotson; Asterisk, vacuum fuel feed. **Clutch**—B.&B., Bork & Beck; B-Lipe Brown-Lipe; Det., Detroit; H-Shaw, Hele-Shaw; Mech., Mechanics; M&E, Merchant & Evans; Lyc., Lycoming; W. G. Co., Warner Gear Co. **Gearset**—B-Lipe, Brown-Lipe; G-Lees, Grant-Lees; Det., Detroit; Mech., Mechanics; Cover., Covert; Sabg., Savage Arms; W. G. Co., Warner Gear Co. Final Drive—in-g., internal gear; d-rd., double reduction; s-bev., spiral bevel; ext-g., external gear. **Axle**—Timkn., Timken; Torbn., Torbenson; Key-H, Keystone-Hindley; Shel., Sheldon; Salsby., Salisbury; Ind., Industrial; Chcgo., Chicago-Standard; Chgo., Chicago; W-W., Walker-Weiss; Emp., Empire. **Steering Gear**—Gem., Gemmer; Lavn., Lavine; Warn., Warner; Ditw., Ditweiler; Jacx., Jacox; Fost., Foster; Wol., Wohlrab. **Tires**—Astesrik, pneumatic.

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl., Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
Parker, F20	2	3,500	34x4	36x4d	Cont.	4-4x6	Bosch	West.	Mon.	Strom.	B-Lipe	Own	worm	Own	Ross
Parker, J20	3½	4,400	36x5	40x5d	Wis.	4-4½x6	Bosch	West.	Mon.	Strom.	B-Lipe	Own	worm	Own	Ross
Parker, M20	5	5,500	36x6	40x6d	Cont.	4-4½x6	Bosch	West.	Simp.	Strom.	B-Lipe	Own	worm	Timkn.	Ross
Patriot, Revere	⅜	1,890	35x5*	35x5*	Cont.	4-3½x5	.....	.....	.....	Strom.	B.&B.	Covert	worm	Empire	.....
Patriot, Lincoln	1½	2,650	34x3½	34x3½d	Hink.	4-4 x5½	Split.	.....	Hink.	Strom.	Covert	Fuller	worm	Empire	Ross
Patriot, Washingto	2½	3,650	36x4	36x4d	Hink.	4-4½x5½	.....	.....	Hink.	Strom.	Covert	Covert	worm	Empire	Ross
Peerless	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Peerless	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Peerless	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pierce-Arrow, X4	2	4,300	36x4	36x4d	Own	4-4 x5½	Dixie	Vesta	Own	Own	Own	Own	worm	Own	Own
Pierce-Arrow, R9	5	5,500	36x5	40x6d	Own	4-4½x6	Dixie	Vesta	Own	Own	Own	Own	worm	Timkn.	Ross
Pioneer All Steel, F	2	2,790	36x4	36x7	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Pony	¼	320	28x3	28x3	Own	4-2½x4	A-K	opt.	opt.	Strom.	.....	.....	Chain	Own	Own
Power, B	2	2,950	36x4	36x4d	Cont.	4-4½x5½	Simms	none	Pierce	Strom.	Fuller	Fuller	worm	Timkn	Ross
Ranier, R-11	¾	1,750	34x4½	34x4½	Cont.	4-3½x5½	Simms	none	Mon.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Ranier, R-6	1½	1,975	34x3	34x4	Cont.	4-3½x5½	Simms	none	Mon.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Lavn.
Ranier, R-8	2	2,400	34x4	34x6	Cont.	4-3½x5½	Simms	none	Mon.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Reliance, A-10	1½	2,500	36x3½	36x5	Buda	4-4 x5½	Eise.	Eise.	Pierce	Strom.	Fuller	Fuller	ext-g.	Badger	Ross
Reliance, B-20	2½	3,200	36x4	36x4d	Buda	4-4½x5½	Eise.	Eise.	Pierce	Strom.	Fuller	Cotta	ext-g.	Badger	Ross
Reo, F	¾	1,285	34x4½	34x4½	Own	4-4½x4½	Remy	Remy	none	John.	Own	Own	bevel	Own	Own
Republic, 10	1	1,550	34x3	34x4	Cont.	4-3½x5	Eise.	none	Rugles	Strom.	Fuller	Fuller	in-g.	Torbn.	Jacx.
Republic, 11X	1½	1,885	34x3½	34x5	Cont.	4-3½x5	Eise.	none	Rugles	Strom.	Fuller	Fuller	in-g.	Torbn.	Jacx.
Republic, 19	2½	2,395	36x4	36x7	Cont.	4-4½x5½	Eise.	none	Pharo	Strom.	Fuller	Fuller	in-g.	Torbn.	Jacx.
Republic, 20	3½	3,595	36x5	36x10	Cont.	4-4½x5½	Eise.	none	Pharo	Strom.	Fuller	Fuller	in-g.	Torbn.	Jacx.
Reynolds	1½	2,650	36x3½	36x6	Own	4-4x5½	Eise.	.....	Hink.	Strom.	Own	Own	worm	Own	Own
Reynolds	2½	3,350	36x4	36x8	Own	4-4½x5½	Eise.	.....	Hink.	Strom.	Own	Own	worm	Own	Own
Reynolds	3½	4,350	36x5	36x5	Own	4-4½x5½	Eise.	.....	Hink.	Strom.	Own	Own	worm	Own	Own
Reynolds	5	5,350	36x6	36x6d	Own	4-4½x5½	Eise.	.....	Hink.	Strom.	Own	Own	worm	Own	Own
Riker, B	3	4,600	36x5	36x5d	Own	4-4½x6	Berl.	West.	Own	B.&B.	Own	Own	worm	Own	Ross
Riker, BB	4	4,700	36x5	36x6	Own	4-4½x6	Berl.	West.	Own	B.&B.	G-Lees	bevel	Col.	Gem	Ross
Rock Falls, 9	1½	.....	35x5	35x5	Buda	6-3½x5½	Bosch	West.	none	Ray.	B.&B.	G-Lees	bevel	Col.	Gem
Rowe, CDW	2	3,300	34x4	36x3½	Wis.	4-4 x4	Bosch	.....	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Rowe, CDW	2½	3,575	34x4	36x4d	Wis.	.....	Bosch	.....	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Rowe, CW	1½	2,800	36x6*	36x6*	Wis.	4-3½x5	Bosch	.....	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Rowe, GSW	3	3,900	36x5	36x5d	Wis.	4 x6	Bosch	.....	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Rowe, GPW	3P	4,950	38x7P	42x9P	H-S	3½x5	A-K	West.	.....	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Rowe, HW	4	4,350	36x5	36x6d	Wis.	4½x6	Bosch	.....	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Rowe, FW	5	5,390	36x6	40x6d	Wis.	4½x6	Bosch	.....	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Sandow, G	1	1,895	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	.....	Strom.*	Fuller	Fuller	worm	Shel.	Ross
Sandow, CG	1½	2,190	34x3	34x5	Cont.	4-3½x5	Eise.	.....	.....	Strom.*	Fuller	Fuller	worm	Shel.	Ross
Sandow, J	2½	2,975	36x4	36x7	Cont.	4-4½x5½	Bosch	.....	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sandow, I	2	2,375	36x4	36x6	Cont.	4-3½x5	Eise.	.....	.....	Strom.	Fuller	Fuller	in-g.	Torbn.	Ross
Sandow, K	3½	3,995	36x5	36x5d	Cont.	4-4½x5	Bosch	.....	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sandow, M	5	4,775	36x6	40x6d	Cont.	4-4½x5½	Bosch	.....	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sanford, W-25	2½	3,290	36x5	36x4d	Cont.	4-4½x5½	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Sanford, W-35	3½	4,050	36x6	36x5d	Cont.	4-4½x5½	Bosch	none	Pierce	Strom.	B.&B.	B-Lipe	worm	Shel.	Ross
Sanford, W-50	5	4,950	36x5	40x6d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	B.&B.	B-Lipe	worm	Shel.	Ross
Schacht	2	3,350	36x4	36x7	Buda	4-4½x5½	Bosch	none	Duplx.	Scheb.	Hart.	Own	worm	Own	Own
Schacht	2½	3,650	36x4	36x4d	Buda	4-4½x5½	Bosch	none	Duplx.	Scheb.	Hart.	Own	worm	Own	Own
Schacht	3½	4,150	36x5	36x5d	Buda	4-4½x5½	Bosch	none	Duplx.	Scheb.	Hart.	Own	worm	Own	Own
Schacht	5	5,150	36x5	40x6d	Buda	4-4½x6	Bosch	none	Duplx.	Scheb.	Hart.	Own	worm	Own	Own
Schwartz, B	1½	2,175	34x3½	34x5	Cont.	4-3½x5	Bosch	none	Pierce.	Strom.	B-Lipe	B-Lipe	in-g.	Torbn.	Ross
Schwartz, C	2½	2,675	36x4	36x7	Cont.	4-4½x5½	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	in-g.	Torbn.	Ross
Schwartz, D	5	4,500	36x6	36x6d	Buda	4-4½x6	Bosch	Bijur.	Duplx.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Selden	1½	.....	34x3½	35x5	Cont.	4-3½x5	Bosch	N-E	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Selden	2½	.....	36x4	36x7	Cont.	4-4½x5½	Eise.	N-E	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Selden	3½	.....	36x5	36x10	Cont.	4-4½x5½	Eise.	N-E	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Selden	5	.....	36x6	40x12	Cont.	4-4½x6	Eise.	Conn.	Pierce	Strom.	Dett.	B-Lipe	worm	Timkn.	Gem.
Seneca, L	½	.....	30x3½	30x3½	LeR.	4-3½x4½	Conn.	A-Ch.	.....	Scheb.	B.&B.	Warren	bevel	Peru	Ditw.
Service, 220	1	2,245	34x3½	34x5½*	Buda	4-3½x5½	Eise.	West.*	none	Strom.*	Fuller	Fuller	worm	Timkn.	Ross
Service, 31	1½	2,785	36x3½	36x6	Buda	4-4x5½	Eise.	West.*	Duplx.	Strom.*	B.&B.	B-Lipe	worm	Timkn.	Ross
Service, 36	1½	3,215	35x5*	38x7*	Buda	4-4½x5½	Eise.	West.*	Duplx.	Strom.	B.&B.	B-Lipe	worm	Timkn.	Ross
Service, 51	2½	3,245	36x4	36x7	Buda	4-4½x5½	Eise.	West.*	Duplx.	Strom.	B.&B.	B-Lipe	worm	Timkn.	Ross
Service, 71	3½	4,085	36x5	36x5d	Buda	4-4½x5½	Eise.	West.*	Duplx.	Strom.	B.&B.	B-Lipe	worm	Timkn.	Ross
Service, 76	3½	4,285	36x5	36x5d	Buda	4-4½x6	Eise.	Wesr.*	Duplx.	Strom.	B.&B.	B-Lipe	worm	Timkn.	Ross
Service, 101	5	5,145	36x6	40x6d	Buda	4-4½x6	Eise.	West.*	Duplx.	Strom.	B.&B.	B-Lipe	worm	Timkn.	Gem.
Shaw, M-2	¾	1,975	32x4	32x4	Cont.	4-3½x5	Bosch	.....	.....	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Shaw, M-4	1	2,300	34x3	34x4	Cont.	4-3½x5	Bosch	.....	.....	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Signal, F	1	.....	34x3 ½	36x5	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Signal, H	1½	.....	34x4	36x6	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Signal, J	2	.....	34x4	36x8	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Signal, M	3½	.....	36x5	40x5d	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Signal, R	5	.....	36x6	40x6d	Cont.	4-4½x6	Eise.	none	.....	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Southern, A	1	1,495	34x4	34x4	Buda	4-3½x5½	Delco	.....	Pierce	Zenith	B.&B.	.....	.....	.....	.....
Southern, B	1½	1,795	34x4	34x4	Cont.	4-3½x5	Delco	.....	Pierce	Zenith	B.&B.	.....	.....	.....	.....
Standard, 56	1	2,250	34x3½	34x4	Cont.	4-3½x5	Eise.	none	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Standard, 76	2½	3,200	36x4	36x7	Cont.	4-4½x5½	Eise.	none	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Standard, 66	3½	4,200	36x5	36x5	Cont.	4-4½x5½	Eise.	none	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Standard, 86	5	5,000	36x6d	40x6d	Cont.	4-4½x5½	Eise.	none	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sterling	1½	2,480	36x3½	36x5	Own	4-4x5½	Eise.	West.	Wauk.	Ray.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sterling	2½	3,475	36x4	36x4d	Own	4-4½x5½	Eise.	West.	Wauk.	Ray.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sterling	3½	4,550	36x5	40x5d	Own	4-4½x6½	Eise.	West.	Wauk.	Ray.	M.&E.	Own	worm	Timkn.	Ross
Sterling, W	5	5,350	36x6	40x6d	Own	4-5x6½	Eise.	West.	Wauk.	Ray.	M.&E.	Own	chain	Own	Ross
Sterling, C	5	5,600	36x6	40x5d	Own	4-5x6½	Eise.	West.	Wauk.	Ray.	M.&E.	Own	chain	Own	Ross
Sterling	7½	6,000	36x6	40x7d	Own	4-5x6½	Eise.	West.	Wauk.	Ray.	M.&E.	Own	chain	Own	Ross
Stewart, 11	¾	1,275	32x4*	32x4*	LeR.	4-3½x4½	Eise.	.....	none	Zenith	B.&B.	Durston	in-g.	Clark	C.A.S.
Stewart, 8	1	1,695	34x3½	34x4	Cont.	4-3½x5	Eise.	.....	Spec.	Zenith	B.&B.	Durston	in-g.	Clark	Gem.
Stewart, 9	1¼	2,095	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	Spec.	Zenith	Fuller	Fuller	in-g.	Clark	Ross
Stewart, 7	2	2,695	34x4	34x4d	Cont.	4-4½x5½	Eise.	.....	Pierce	Zenith	Fuller	Fuller	in-g.	Clark	Ross
Stewart, 10	3½	3,650	36x5	36x5d	Cont.	4-4½x5½	Eise.	.....	Pierce	Zenith	Fuller	Fuller	in-g.	Clark	Ross
Stoughton, B	1½	2,200	36x3½	36x5	Wauk.	4-3½x5½	Eise.	.....	.....	Strom.	B-Lipe	B-Lipe	.....	Shel.	.....
Stoughton, D	2	2,600	36x4	36x7	Wauk.	4-4x5½	Eise.	.....	.....	Strom.	B-Lipe	B-Lipe	.....	Shel.	.....
Stoughton, E	3	3,000	36x4	36x5d	Wauk.	4-4½x5½	Eise.	.....	.....	Strom.	B-Lipe	B-Lipe	.....	Shel.	.....
Sullivan, F	1½	2,350	36x4	36x5	Buda	4-3½x4½	Bosch	.....	none	Strom.	.....	Covert	worm	Timkn.	Ross
Sullivan, E	2	2,975	36x4	36x7	Buda	4-4½x5½	Bosch	.....	none	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sullivan, H	3½	.....	36x5	36x5d	Buda	4-4½x6	Bosch	.....	none	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Super Truck, 50	2½	3,200	36x4	36x8	Wis.	4-4x6	.....	Vesta	Simplx.	Zenith	Fuller	.....	worm	Shel.	Lavn.
Super Truck, 70	3½	4,100	36x5	40x5d	Wis.	4-4½x6	.....	Vesta	Simplx.	Zenith	Fuller	.....	worm	Shel.	Ross
Super Truck, 100	5	4,800	36x5	40x6d	Wis.	4-4½x6	.....	Vesta	Simplx.	Zenith	Hill	.....	worm	Shel.	Ross
Superior, D	1	1,600	34x4½	34x4	Cont.	4-3½x5	Eise.	Opt.	Pierce	Strom.	Fuller	Fuller	in-g.	Torbn.	C.A.S.
Superior, E	2	2,475	34x4	36x6	Cont.	4-4½x5½	Eise.	Opt.	Pierce	Strom.	Fuller	Fuller	in-g.	Torbn.	Ross
Texan	1½	1,525	34x4*	34x4	Lyc.	.....	.....	Dneto.*	.....	.....	.....	Muncie	worm	Chcgo.	.....
Tiffin, A	½	1,100	35x4½	35x4½*	Cont.	4-3½x5	Bosch	none	none	Scheb.	Det.	Det.	in-g	Russel	Lavn.
Tiffin, GW	1½	2,415	36x3½	36x5	Cont.	4-3½x5½	Bosch	none	Pierce	Scheb.	Fuller	Fuller	worm	Shel.	Ross
Tiffin, MW	2½	3,200	36x4	36x3½d	Cont.	4-4½x5½	Bosch	none	Pierce	Scheb.	Hart	Fuller	worm	Shel.	Ross
Tiffin, PW	3½	4,175	36x5	36x5d	Cont.	4-4½x5½	Bosch	West.*	Pierce	Scheb.	B.&B.	Fuller	worm	Shel.	Ross
Tiffin, RW	5	5,250	36x6	40x6d	Cont.	4-4½x5½	Bosch	West.	none	Scheb.	B.&B.	Covert	worm	Shel.	Ross
Tiffin, SW	9	5,450	36x6	40x12	Cont.	4-4½x5½	Bosch	West.*	none	Scheb.	B.&B.	Covert	worm	Shel.	Ross
Titan, 2½	2½	3,400	34x4	36x4d	Buda	4-4½x5½	Eise.	none	Simplx.	Strom.	B.&B.	Cotta	in-g	Clark	Wol.
Titan, T	3½	4,400	36x5	40x5d	Buda	4-4½x6	Eise.	West.	Simplx.	Strom.	B.&B.	Cotta	in-g	Clark	Lavn.
Titan, H	6	5,400	36x6	40x6d	Buda	4-4½x6	Eise.	West.	Simplx.	Strom.	B.&B.	Cotta	in-g	Clark	Lavn.
Tower, J	1½	.....	35x5	38x7	Cont	4-4½x5½	Bosch	.....	.....	Zenith	.....	.....	worm	.....	Ross
Tower, H	2½	.....	36x4	36x7	Cont.	4-4½x5½	Bosch	.....	.....	Zenith	Fuller	Fuller	worm	.....	Ross
Tower, G	3½	.....	36x5	36x5	Cont.	4-4½x5½	Bosch	.....	.....	Zenith	Fuller	Fuller	worm	.....	Ross
Traffic	...	1,395	34x3½	34x5	Cont.	4-3½x5	Bosch	none	none	Carter	Covert	Covert	in-g	Russel	Own
Transport, 20	1	1,750	34x3	34x4	Cont.	4-3½x5	Eise.	none	Duplx.	Strom.	Fuller	Fuller	in-g	Clark	Jacx.
Transport, 30	1½	2,050	36x3½	36x5	Cont.	4-3½x5	Eise.	none	Duplx.	Strom.	Fuller	Fuller	in-g	Clark	Jacx.
Transport, 50	2	2,585	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	Duplx.	Strom.	Fuller	Fuller	in-g	Clark	Jacx.
Triangle, AA	⅜	1,550	35x5	35x5	H-S	4-3½x5	N. E.	N. E.	none	Strom.	Fuller	Fuller	in-g	Clark	Gem.
Triangle, A	1½	2,185	34x3½	34x6	Wauk.	4-3½x5½	Eise.	none	Wauk.	Strom.	Fuller	Fuller	in-g	Clark	Gem.
Triangle, C	2	2,585	36x4	36x6	Wauk.	4-3½x5½	Eise.	.....	Wauk.	Strom.	Fuller	Fuller	in-g	Clark	Gem.
Triangle, B	2½	2,850	36x7	36x7	Ruten.	4-4½x5½	Eise.	.....	Pierce	Strom.	Fuller	Fuller	in-g	Clark	Gem.
Union, F	2½	2,675	36x4	36x7	Wis.	4-4x6	Eise.	opt.	Duplx.	Scheb.	Fuller	Fuller	in-g	Russel	Ross
Union, H	4	3,500	36x6	36x10	Wis.	4-4½x6	Eise.	opt.	Duplx.	Scheb.	Fuller	Fuller	in-g	Russel	Ross
United, A	1½	2,100	36x3½	36x6	Buda	4-3½x5½	Eise.	opt.	Simplx*	Strom.	B-Lipe	B-Lipe	in-g	Clark	Ross
United, B	2½	2,850	36x4	36x7	Buda	4-4½x5½	Eise.	.....	Simplx*	Strom.	B-Lipe	B-Lipe	in-g	Clark	Ross
United, C	3½	3,750	36x5	36x5d	Buda	4-4½x5½	Eise.	.....	Simplx*	Strom.	B-Lipe	B-Lipe	in-g	Clark	Ross
United, V	5	4,750	36x5	40x6d	Buda	4-4½x6	Eise.	.....	Simplx*	Strom.	B-Lipe	B-Lipe	in-g	Clark	Ross
U. S., N	1½	2,150	36x3½	36x5	Cont.	4-3½x5	Eise.	G.&D.	Mon.	Strom.	B-Lipe	B-Lipe	in-g	Clark	Lavn.
U. S., H	2½	3,250	34x4	36x4d	Cont.	4-4½x5½	Eise.	Eise.	Pierce	Strom.	Hart.	B-Lipe	worm	Shel.	Lavn.
U. S., J	3½	3,950	36x5	40x5d	Cont.	4-4½x5½	Eise.	Eise.	Pierce	Strom.	Hart.	B-Lipe	worm	Shel.	Lavn.
U. S., K	5	4,850	36x5	40x6d	Wauk.	4-4½x6½	Eise.	Eise.	Wauk.	Strom.	B.&B.	Cotta	worm	Shel.	Lavn.
Velie, 46	1½	1,925	36x3½	36x5	Cont.	4-3½x5	Bosch	none	none	Strom.	B.&B.	Durst.	in-g	Torbn.	Own

Abbreviations: **Engine**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swartz; Bea., Beaver. **Ignition**—Eise., Eisemann A-K, Atwater Kent; Koko, Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite. **Electric Lighting**—Nlite, Nicolite; G&D, Gray & Davis; A-L, Auto-Lite; Dneto., Dyneto; Al-Ch., Allis-Chalmers; West, Westinghouse; L-N, Leece-Neville; Det., Detroit; N-E, North East; Wag., Wagner; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Duplx., Duplex; Cont., Continental; Mon., Monarch; Simplx., Simplex; McCan., McCanna; Rugles., Ruggles. **Carburetor**—Scheb., Schebler; Strom., Stromberg; Ray., Rayfield; King., Kingston; Mon., Monarch; Shake., Shakespeare; Car., Carter; Flech., Fletcher; Holl., Holley; Ens., Ensign; Mast., Master; John., Johnson; Stew., Stewart; Till., Tillotson; Asterisk, vacuum fuel feed. **Clutch**—B.&B., Bork & Beck; B-Lipe Brown-Lipe; Det., Detroit; H-Shaw, Hele-Shaw; Mech., Mechanics; M&E, Merchants & Evans; Lyc., Lycoming; W. G. Co., Warner Gear Co. **Gearset**—B-Lipe, Brown-Lipe; G-Lees, Grant-Lees; Det., Detroit; Mech., Mechanics; Cover., Covert; Sabg., Savage Arms; W. G. Co., Warner Gear Co. **Final Drive**—in-g., internal gear; d-rd., double reduction; s-bev., spiral bevel; ext-g., external gear. **Axle**—Timk., Timken; Torbn., Torbenson; Key-H, Keystone-Hindley; Shel., Sheldon; Salsby., Salisbury; Ind., Industrial; Chcgo., Chicago-Standard; Chgo., Chicago; W-W., Walker-Weiss; Emp., Empire. **Steering Gear**—Gem., Gemmer; Lavn., Lavine; Warn., Warner; Ditw., Ditweiler; Jacx., Jacox; Fost., Foster; Wol., Wohlrab. **Tires**—Asterisk, pneumatic.

Motor Age Monthly Guide to Truck Specifications—Concluded

These tables are revised and brought up to date monthly

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl., Bore and Stroke	Ignition	Electric Lighting	Governor	Carburetor	Clutch	Gearset	Final Drive	Axle	Steering Gear
Velie, 20B	3½	3,900	36x5	36x5d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	B.&B.	B-Lipe	worm	Timkn.	Gem.
Vim, 27	½	1,095	31x4	31x4	Own	4-3x4½	A-K	West.	none	Zenith	Own	Own	worm	Shel.	CAS
Vim, 28	1	1,350	32x4½	32x4½	Own	4-3x4½	A-K	West.	none	Zenith	Own	Own	worm	Shel.	CAS
Vim, 25	1	2,195	35x5	35x5	Herc.	4-3½x5½	Split.	none	none	Zenith	B-Lipe	B-Lipe	worm	Shel.	Gem.
Vim, 22	2	3,150	36x6	36x6	Herc.	4-3½x5½	Split.	none	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Gem.
Vim, 23	3	3,950	36x5	36x5d	Herc.	4-4½x5½	Split.	none	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Gem.
Walker Johnson,B	2½	2,890	36x4	36x8	Buda	4-4½x5½	Eise.	none	Pierce	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Walker, MO	3	....	40x4d	40x4d	Own	4-4½x6	.....	none	Own	Zenith	Own	Own	ext-g	Own	Own
Walker, S	5	5,500	36x6	40x6d	Wauk.	4-4½x6½	Simms	West.	Own	Strom.	B-Lipe	Warn.	in-g	Own	Ross
Ward La France, 2-B	2½	3,390	36x4	.....	.....	4-4½x5½	Bosch	opt.	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Ward La France, 4-A	3½	4,290	36x5	36x5d	.....	4-4½x6½	Bosch	opt.	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Ward La France, 5 A	5	5,290	36x6	40x6d	.....	4-5x6½	Bosch	opt.	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Watson	¾	1,750	34x4½	34x4½	Wauk.	4-3½x5½	Dyn.	Dyn.	Wauk.	John.	B-Lipe	B-Lipe	worm	Own	Lavn.
Watson	3½	....	36x5	36x10	Cont.	4-4½x5½	Simms	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
White, 15	¾	2,400	34x4½	34x4½*	Own	4-3½x5½	.....	.....	none	Own	Own	Own	bevel	Own	Own
White, 20	2	3,300	36x4	36x7	Own	4-3½x5½	.....	.....	none	Own	Own	Own	d-rd	Own	Own
White, 40	3	4,300	36x5	40x5d	Own	4-3½x5½	.....	.....	Own	Own	Own	Own	d-rd	Own	Own
White, 45	5	5,000	36x6	40x6d	Own	4-4½x5½	.....	.....	Own	Own*	Own	Own	d-rd	Own	Own
White, Hickory, H	1½	2,475	36x3½	36x5	Cont.	4-3½x5	Eise.	none	Simplx.	Strom.	Fuller	Fuller	worm	Timkn.	Ross
White, Hickory, K	2½	3,075	36x4	36x7	Cont.	4-4½x5½	Eise.	none	Simplx.	Strom.	Fuller	Fuller	worm	Timkn.	Lavn.
Wichita, L	1½	2,350	36x3½	36x5	Own	4-3½x5	.....	.....	none	Strom.	Own	Covert	worm	Shel.	Ross
Wichita, M	2	2,750	36x4	36x6	Own	4-3½x5½	.....	.....	none	Strom.	Own	Covert	worm	Shel.	Ross
Wichita, R	2½	2,950	36x4	36x7	Wauk.	4-3½x5½	.....	.....	Wauk.	Strom.	Hart.	B-Lipe	worm	Shel.	Ross
Wichita, RX	2½	3,400	36x4	36x8	Wauk.	4-4½x5½	.....	.....	Wauk.	Strom.	Hart.	B-Lipe	worm	Shel.	Ross
Wichita, O	3½	3,750	36x5	36x5d	Beav.	4-4½x6	.....	.....	Duplx.	Strom.	Hart.	B-Lipe	worm	Shel.	Ross
Wichita, S	6	5,400	36x6	40x6d	Beav.	4-4½x6	.....	.....	Duplx.	Strom.	Hart.	Own	d-rd	Shel.	Ross
Wilcox, A-1	1	.....	35x5	35x5	Buda	4-3½x5½	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Wis.	Gem.
Wilcox, B	1½	.....	36x4	36x5	Own	4-4½x5	Bosch	none	Pierce	Wil-B	Own	Own	worm	Wis.	Own
Wilcox, C	2½	.....	36x4	36x3d	Own	4-4½x6	Bosch	none	Pierce	Wil-B	Own	Own	worm	Wis.	Own
Wilcox, E	3½	.....	36x5	36x5d	Buda	4-4½x5	Bosch	none	Pierce	Wil-B	Own	Own	worm	Shel.	Own
Wilcox, W	5	.....	36x5	40x6d	Wauk.	4-4½x6½	Bosch	none	Wauk.	Wil-B	Own	B-Lipe	worm	Timkn.	Own
Wilson, F	1½	2,450	36x3½	36x5	Cont.	4-3½x5	Eise.	opt.	Pierce	Marvel	B.&B.	B-Lipe	worm	Timkn.	Ross
Wilson, EA	2½	3,150	36x4	36x7	Cont.	4-4½x5½	Eise.	opt.	Pierce	Marvel	B.&B.	B-Lipe	worm	Timkn.	Ross
Wilson, G	3½	3,950	36x5	36x5d	Cont.	4-4½x5½	Eise.	opt.	Pierce	Marvel	Warner	B.&B	worm	Timkn.	Ross
Wilson, H	5	4,800	36x6	40x6d	Cont.	4-4½x5½	Eise.	.....	Pierce	Marvel	Warner	B.&B	worm	Timkn.	Ross
Winther, 30	1½	2,325	34x3½	34x5	Wis.	4-3½x5	Eise.	Bijur.*	.....	Strom.	Fuller	Fuller	in-g	Clark	Lavn.
Winther, 439	1½	2,575	32x4	32x4	Wis.	4-3½x5	Eise.	.....	.....	Strom.	B-Lipe	B-Lipe	in-g	Clark	Lavn.
Winther, 49	2	....	34x4	34x4d	Wis.	4-4x5	Eise.	Bijur.*	.....	Mast.*	B-Lipe	B-Lipe	in-g	Clark	Ross
Winther, 70	3	4,100	36x5	36x5d	Wis.	4-4x6	Eise.	Bijur.*	.....	Mast.*	B-Lipe	B-Lipe	in-g	Clark	Ross
Winther, 89	4	4,500	36x5	40x5d	Wis.	4-4½x6	Eise.	Bijur.*	Simplx.	Mast.*	B-Lipe	B-Lipe	in-g	Clark	Ross
Winther, 109	5	5,000	36x6	40x6d	Wis.	4-4½x6½	Eise.	Bijur.*	Simplx.	Mast.*	B-Lipe	B-Lipe	in-g	Clark	Ross
Winther, 129	6	5,250	36x6	40x12	Wis.	4-5½x6	Eise.	Bijur	Simplx.	Mast.*	B-Lipe	B-Lipe	in-g	Clark	Ross
Winther, 149	7	5,500	36x6	40x7d	Wis.	4-5½x6	Eise.	Bijur	Simplx.	Mast.*	B-Lipe	B-Lipe	in-g	Clark	Ross
Winther, 459	2½	....	34x5	34x5	Wis.	4-4x5	Eise.	.....	.....	Strom.	Fuller	Fuller	in-g	Clark	Lavn.
Winther, 479	3½	....	36x5	36x5d	Wis.	4-4½x6	Eise.	Bijur.	.....	Mast.	B.&B.	B-Lipe	in-g	Clark	Ross
Winther, 979	3½	4,900	36x5	38x5d	Wis.	4-4½x6	Eise.	Bijur	.....	Mast.	B.&B.	B-Lipe	in-g	Clark	Ross
Witt-Will, N	1	4,250	38x7	42x9	Wis.	4-4½x6½	Eise.	.....	.....	Mast.	B.&B.	B-Lipe	in-g	Timkn.	Ross
Witt-Will, P	2½	2,000	36x3*	36x4*	Cont.	4-3½x5½	Eise.	.....	Pierce	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Wolverine, C	1½	2,950	36x3½*	36x3½d	Cont.	4-4½x5½	Eise.	.....	Pierce	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Wolverine, D	2	2,380	34x3½	34x5	Cont.	4-3½x5	Eise.	G&D*	Mon.	Strom.	Fuller	Fuller	in-g	Russel	Gem.
		2,650	34x4	34x4d	Cont.	4-3½x5	Eise.	G&D	Mon.	Strom.	Fuller	Fuller	in-g	Russel	Gem.

Abbreviations: **Engine**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swartz; Bea., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko, Kokomo; Split., Splitdorf, Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite **Electric Lighting**—Nlite, Nicolite; G&D, Gray & Davis; A-L, Auto-Lite; Dneto., Dyneto; Al-Ch., Allis-Chalmers; West., Westinghouse; L-N, Leece-Neville; Det., Detroit; N-E, North East; Wag., Wagner; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Duplx., Duplex; Cont., Continental; Mon., Monarch; Simplx., Simplex; McCan., McCanna; Ruggles., Ruggles. **Carburetor**—Scheib., Scheibler; Strom-Stromberg; Ray., Rayfield; King., Kingston; Mon., Monarch; Shake., Shakespeare; Car., Carter; Fleet., Fletcher; Holl., Holley; Ens., Ensign; Mast., Master; John., Johnson; Stew., Stewart; Till., Tillotson; Asterisk, vacuum fuel feed. **Clutch**—B.&B., Bork & Beck; B-Lipe Brown-Lipe; Det., Detroit; H-Shaw, Hele-Shaw; Mech., Mechanics; M&E, Merchant & Evans; Lyc., Lycoming; W. G. Co., Warner Gear Co. **Gearset**—B-Lipe, Brown-Lipe; G-Lees, Grant-Lees; Det., Detroit; Mech., Mechanics; Cover., Covert; Sab., Salisbury; Ind., Industrial; Chgo., Chicago Standard; Chgo., Chicago; W.-W., Walker-Weiss; Emp., Empire. **Steering Gear**—Gem., Gemmer; Lavn., Lavine; Warn., Warner; Ditw., Ditweiler; Jacx., Jacox; Fost., Foster; Wol., Wohlrab. **Tires**—Asterisk, pneumatic.

SAYS DEALERS EVADE LICENSES

(Continued from page 52)

using the 1919 tags. According to Charles A. Cook, chief clerk of the State Department in charge of motor vehicle licenses, this means that several thousand owners of cars will have to put their automobiles up on March 1st until such time as licenses can be issued them. About 27,000 licenses have already been issued but it is a physical impossibility to take care of 100,000 applications before March 1 because of the various intricacies of the new law which imposes a graduated scale according to horsepower. Owners of motor vehicles have been repeatedly warned by the newspapers and the dealers to get their applications in early, but they have not responded and will therefore have to put up their cars on March 1 if they do not have their 1920 licenses. Just how long this will be is not known, but in some cases it will no doubt run into several weeks' time.

This situation results from the abuse of the temporary pasteboard tag privilege according to the Secretary of State. With a view to keeping track of cars sold Mr. McLendon issued these tags to dealers in batches of twenty-five, each tag having a stub to be torn off and returned by the dealer when the purchaser had secured the metallic tag required by the law. Dealers were not furnished a new batch of tags until they had returned at least twenty stubs, showing the names of purchasers and the date of purchase.

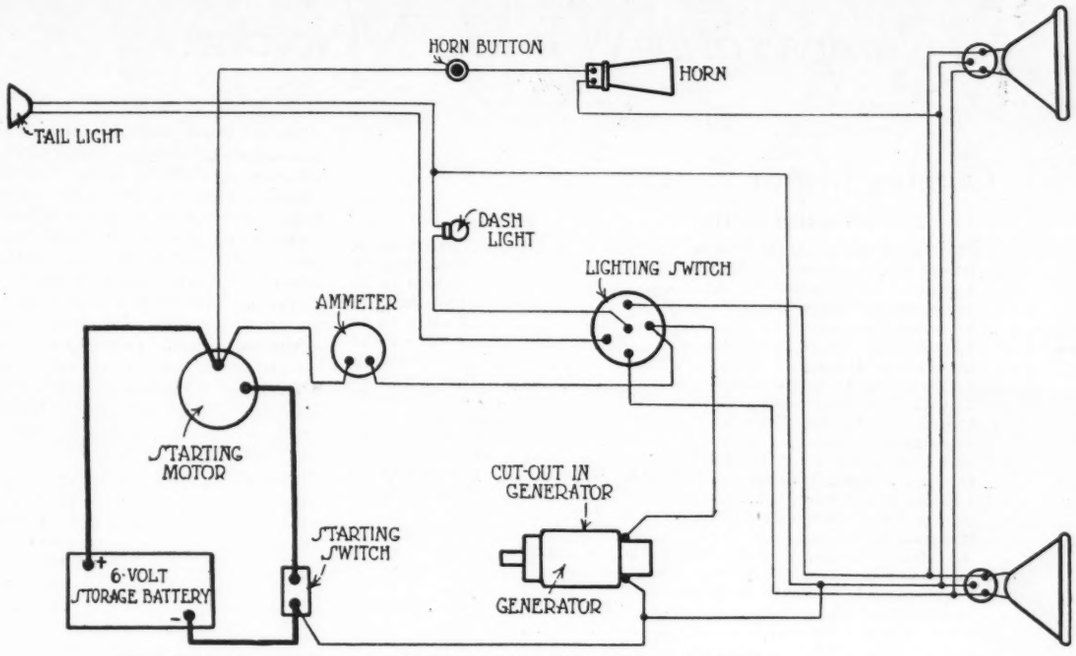
Use Crude Substitutes

Whereupon the trouble began. The first batch of tags came in from a local automobile concern with a request that another batch be sent at once. Only one of these stubs bore any indication of having been used at all. Had the tags been attached to the rear of automobiles for a period of ten days as required, Mr. McLendon is of the opinion that they would certainly have shown some signs of usage. But, still more remarkable than that, although the names of alleged purchasers were written on the stubs, the records showed that a metallic tag had been issued to only one of the lot. Had the cardboard tags been used legally the Secretary of State should have had a record of a metallic tag issued for every automobile reported sold.

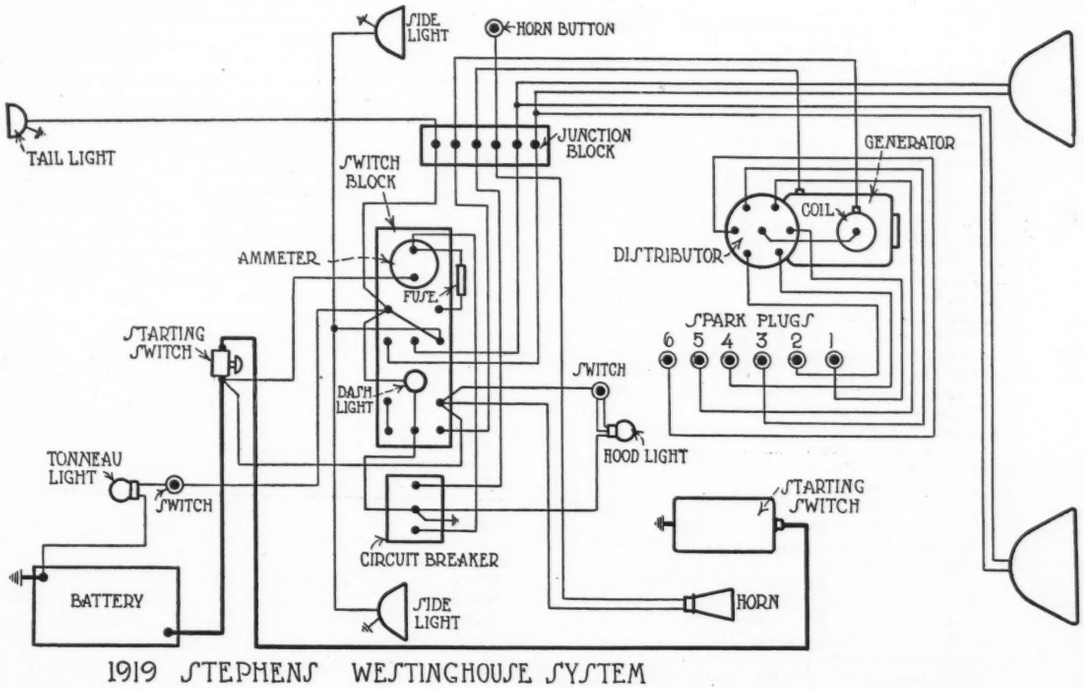
Some of the methods resorted to to escape paying the license fees by the use of cardboard tags are crude, to say the least. One man had a cardboard tag printed himself when he lost his metallic tag and seemed very much surprised when told that he had committed a "chaingang" offense. Another applied to the secretary for a renewal of his ten day period or a new cardboard tag. One dealer sent a batch of twenty-five tags to Detroit and used them on cars being driven through the country to Atlanta. This, of course, was direct violation of the law as the pasteboard tag was never intended for such use.

Meanwhile the matter remains as it stands as there is no way of holding dealers and purchasers of new cars to the use intended by the law.

Motor Age Weekly Wiring Chart No. 64



1916 NATIONAL SERIES A.C. "HIGHWAY SIX" WESTINGHOUSE SYSTEM



1919 STEPHENS WESTINGHOUSE SYSTEM

THIS WEEK

1919 National 1919 Stephens

Allen—Dec. 18, '19
Auburn—Nov. 27, '19
Briscoe—Oct. 16, '19
Buick—Oct. 23, '19
Case—Oct. 2, '19
Chalmers—Nov. 27, '19
Crow-Elkhart—June 26, '19
Cutting—Nov. 6, '19
Daniels—Dec. 4, '19
Davis—Dec. 4, '19
Dorris—Dec. 11, '19
Empire—Oct. 30, '19
Essex—Oct. 23, '19
Ford—May 15, 22, '19
Franklin—June 19, '19; Dec. 11, '19
General Battery Charging—Sept. 25, '19
General Magneto Diagram—June 5, '19
Haynes—Oct. 9, '19
Hupmobile—Oct. 16, '19
Internal Connections—July 10-17-24, '19
Keeton—Nov. 6, '19
King—July 3, '19
Kissel—July 3, '19
Lexington—Jan. 1, '20
Liberty—Jan. 1, '20
Marmon—Dec. 25, '19; Jan. 22, '20
Maxwell—Aug. 14, '19
Mercer—Aug. 28, '19; Nov. 27, '19
Mitchell—Jan. 8, '20
Monroe—Oct. 30, '19
Moon—Jan. 29, '20
National—June 19, '19
Oakland—Oct. 16, '19
Olympian—Jan. 22, '20
Owen Magnetic—Sept. 18, '19
Packard—June 19, '19; July 31, '19
Paige—July 3, '19
Paterson—June 26, '19; July 9, '19
Pierce-Arrow—Oct. 2, '19; Feb. 5, '20
Reo—Aug. 21, '19; Oct. 9, '19; Nov. 13, '19
Scripps-Booth—Jan. 15, '20
Stanley—June 26, '19
Stearns-Knight—Jan. 8, '20
Studebaker—Dec. 25, '19
Stutz—Feb. 5, '20
Templar—Jan. 29, '20
Velie—Sept. 25, '19
Westcott—Jan. 15, '20
White—Sept. 25, '19
Special Systems for Fords—May 15-22, '19

From the Four Winds

Glimpses at the World of Motordom

Coming Motor Events

AUTOMOBILE SHOWS

Charlotte, N. C.	Charlotte Automobile Trade Ass'n	Feb. 9 to 14
Greenfield, Mass	Mass. State Armory	Feb. 9 to 14
New Haven, Conn	Automobile Dealers' Assn.	Feb. 9 to 14
Nashville, Tenn.	Automobile Show	Feb. 9 to 14
Salt Lake City	Automobile Show	Feb. 9 to 14
Cedar Rapids, Iowa	Automobile Show	Feb. 9 to 14
Deadwood, S. D.	Deadwood Business Club	February
Council Bluffs, Ia.	Automobile Dealers' Ass'n	Feb. 10 to 14
Quincy, Ill.	Automobile Show	Feb. 10 to 15
Evansville, Ind.	Evansville Dealers' Ass'n	Feb. 11 to 14
Albany, N. Y.	Automobile Show	Feb. 14 to 21
Brooklyn, N. Y.	Motor Vehicle Dealers' Ass'n	Feb. 14 to 21
Detroit, Mich.	Detroit Automobile Dealers' Ass'n	Feb. 14 to 21
San Antonio, Tex.	Automobile Show	Feb. 14 to 22
Des Moines, Ia	Des Moines Automobile Dealers' Ass'n	Feb. 16 to 21
Des Moines, Ia	Herring Motor Co	Feb. 16 to 21
Hazelton, Pa	Hazelton Automobile Trade Ass'n	Feb. 16 to 21
Manchester, N. H.	Automobile Show, Academy	Feb .16 to 20
St. Louis	St. Louis Automobile Mfrs. & Dealers' Ass'n	Feb. 16 to 21
New Haven, Conn	Automobile Show	Feb. 16 to 21
Waterloo, Iowa	First Annual Show	Feb. 21 to 26
Duluth, Minn.	Automobile Show	Feb. 23 to 28
San Francisco	San Francisco Motor Car Dealers' Ass'n	Feb. 21 to 28
Ottawa, Canada	Motor Show	Feb. 21 to 28
Bethlehem, Pa.	Sixth Annual Show	Feb. 23 to 28
Louisville, Ky.	Louisville Automobile Dealers' Ass'n	Feb. 23 to 28
Pittsfield, Mass.	Mass. State Armory	Feb. 23 to 28
Portland, Ore.	Portland Automobile Trade Ass'n	Feb. 23 to 28
Grand Rapids, Mich.	Automobile Show	Feb. 23 to 28
Wichita, Kans.	Automobile Show	Feb. 23 to 28
Columbus, Ohio	Memorial Hall	Feb. 24 to 28
Fort Dodge, Ia.	Automobile Dealers' Ass'n	Feb. 24 to 28
Newark, N. J.	First Regiment Armory	Feb. 28 to March 6
St. Joseph, Mo.	St. Joseph Automobile Dealers' Ass'n	March 1 to 6
Omaha, Nebr.	Automobile Show	March 1 to 6
Scranton, Pa.	Automobile Show	March 1 to 6
Buffalo, N. Y.	Buffalo Automobile Dealers' Ass'n	March 1 to 6
Portland, Maine	Portland Automobile Dealers' Ass'n	March 1 to 6
Perth Amboy, N. J.	First Automobile Show	March 1 to 6
Lyons	Automobile Show	March 1 to 8
Springfield, Mass.	Springfield Automotive Dealers' Ass'n	March 1 to 7
Tulsa, Okla.	Wichita Motor Trade Ass'n	March 1 to 8
Syracuse, N. Y.	Syracuse Automobile Dealers' Ass'n	March 1 to 6
Seattle, Wash.	Seattle Automobile Show	March 1 to 6
Denver	Denver Automobile Trade Ass'n	March 2 to 6
Clinton, Iowa	Clinton Automobile Dealers' Ass'n	March 3 to 6
Quincy, Ill.	Quincy Automobile Dealers' Ass'n	March
Lancaster, Pa.	Automobile Show	March 3 to 6
Gloversville, N. Y.	Automobile Show	March 8 to 13
Indianapolis, Ind.	Automobile Show	March 8 to 13
Jersey City, N. J.	Automobile Show	March
Boston, Mass.	Mechanics' Bldg.	March 13 to 20
New Orleans	Automobile Show	March
Little Rock, Ark.	Liberty Hall	March 2 to 6
La Salle, Ill.	Illinois Valley Automobile Dealers' Ass'n	March 12 to 14
Great Falls, Mont.	Automobile Show	March 15 to 22
Wilkes-Barre, Pa.	Passenger Car & Truck Show	March 15 to 22
Oklahoma City, Okla.	Oklahoma City Dealers' Ass'n	March 22 to 27
Torrington, Conn	Automobile Show	March 22 to 27
Goldsboro, N. C.	Goldsboro Automotive Trade Ass'n	March 31 to Apr. 3
Albany, Ala.	Automobile Show	April 6 to 10

TRUCK SHOWS

New Haven, Conn	Automobile Dealers' Ass'n	Feb. 16 to 21

TRACTOR SHOWS

Wichita, Kan.	Wichita Tresher-Tractor Club	Feb. 9 to 14
Kansas City, Mo.	Kansas City Tractor Club	Feb. 16 to 21

MISCELLANEOUS CONVENTIONS AND MEETINGS

Lake Charles, La.	Louisiana-Mississippi Automotive Trade Ass'n Convention	March 17 to 18

RACES

Beverly Hills, Los Angeles	Washington's Birthday Race	February 21
Beverly Hills, Los Angeles	Track Race	March 17
Indianapolis Speedway	500-Mile Race	May 31
Tacoma, Washington	Speedway Race	July 5

TOURS

New York-San Francisco	Glidden Tour	September
Lake Huron Tour		July

New York License Plate Colors Announced—New York State isn't taking any chances on some other nearby commonwealth stealing its 1921 color combination. Secretary of State Francis M. Hugo announced that 1921 plates in the Empire state will be dark blue with white numerals. Early announcement was necessary, as next year's plates are to be made in state prisons and longer time will be required than had the contract been awarded to an organized industry. The 1920 New York State plates will appear on Feb. 1. They will be a light pea green with numerals in black, and are unusually attractive.

Canadian Import Duty Large—A statement from the Department of Customs showing the value of automobiles and parts imported and entered for consumption in Canada during the calendar year 1919, also the duty customs war tax and excise tax collected thereon reveals the fact that automobiles and parts thereof during that period yielded the surprising revenue of $13,886,097.25.

In view of the arguments advanced in many quarters that the revenue from automobiles together with the license fees for the operation of cars in the various provinces should be for the improvement of highways it is interesting to note that in one year the revenue from automobiles is more than half the amount set aside by the Dominion Government to be allotted for highway improvements and development over a five year period. The Federal aid to highways plans calls for the expenditure by the Dominion Government of $20,000,000 within the next five years.

Under the heading of passenger automobiles the customs figures give the total of 9,637 machines valued at $9,304,235. The duty on these was $3,255,465.50, customs war tax, $697,614.27, and the excise war tax $4,649,450, making a total duty of $8,602,528.77.

Commercial automobiles to the number of 2,113 were valued at $3,437,464. The duty on these was $1,200,207.90, customs war tax $257,228.90. There was no excise war tax on this class of vehicle or on automobile parts. The total for commercial vehicles was $1,457,436.80.

Automobile parts valued at $9,979,041 brought $3,077,988.39 in duty and $748,142.29 in customs war tax, a total of $3,826,130.68. The grand total of $13,886,097.25 includes war tax levied on imported automobiles and also on those of domestic manufacture.

La Salle, Ill., Sets Show Dates.—The Illinois Valley Automobile Dealers' Ass'n will hold the annual show in La Salle, Ill., March 12, 13 and 14. Due to the war, the association abandoned the shows in the two preceding years. A committee on management was appointed comprising M. A. Knauff, V. C. Kinder and H. A. Roy. Following the decision to stage a show, the annual election of the association was held, new officers being chosen as follows: President, W. J. Kinder; vice-president, John E. Seepe; secretary, A. H. Korte.